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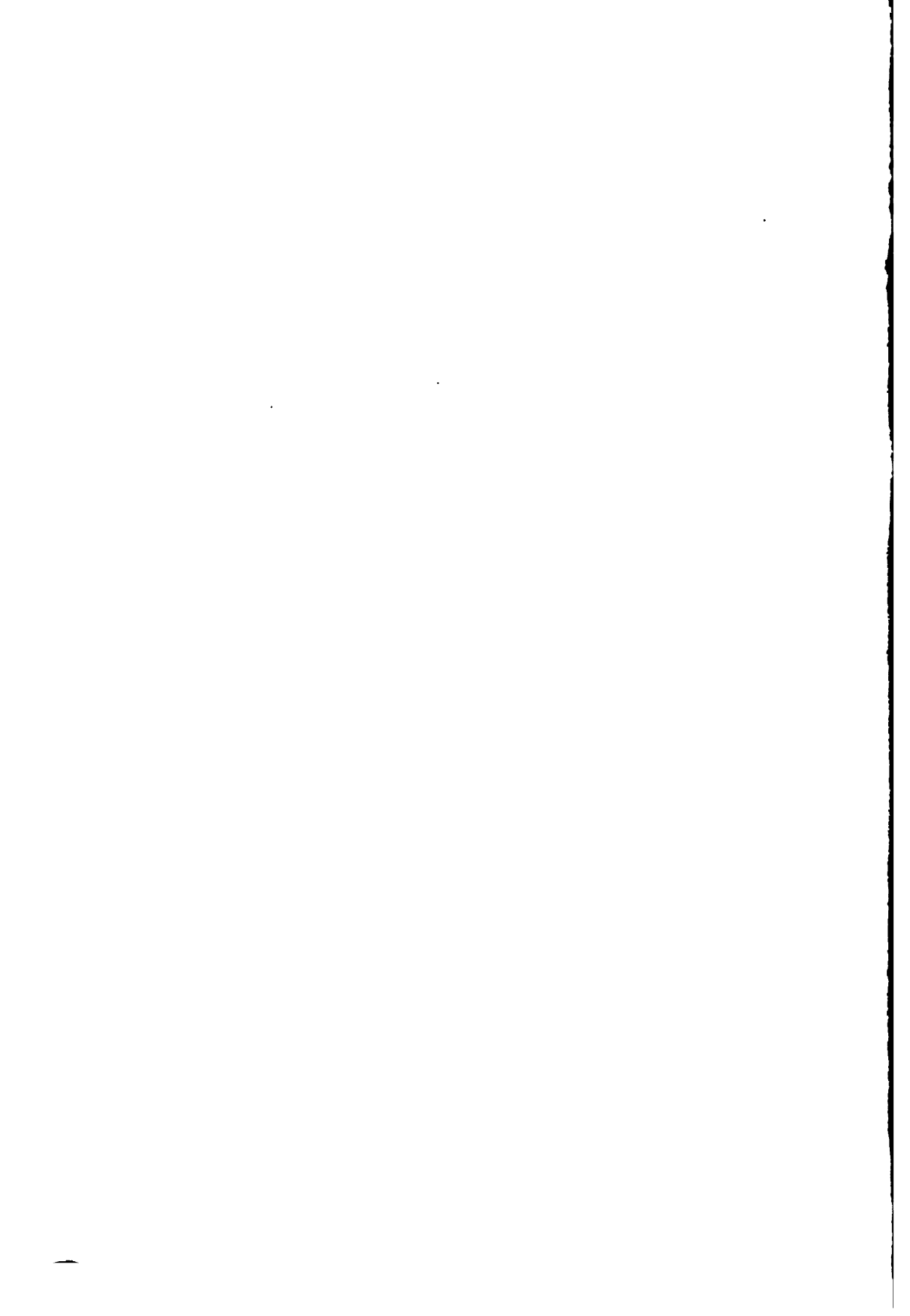
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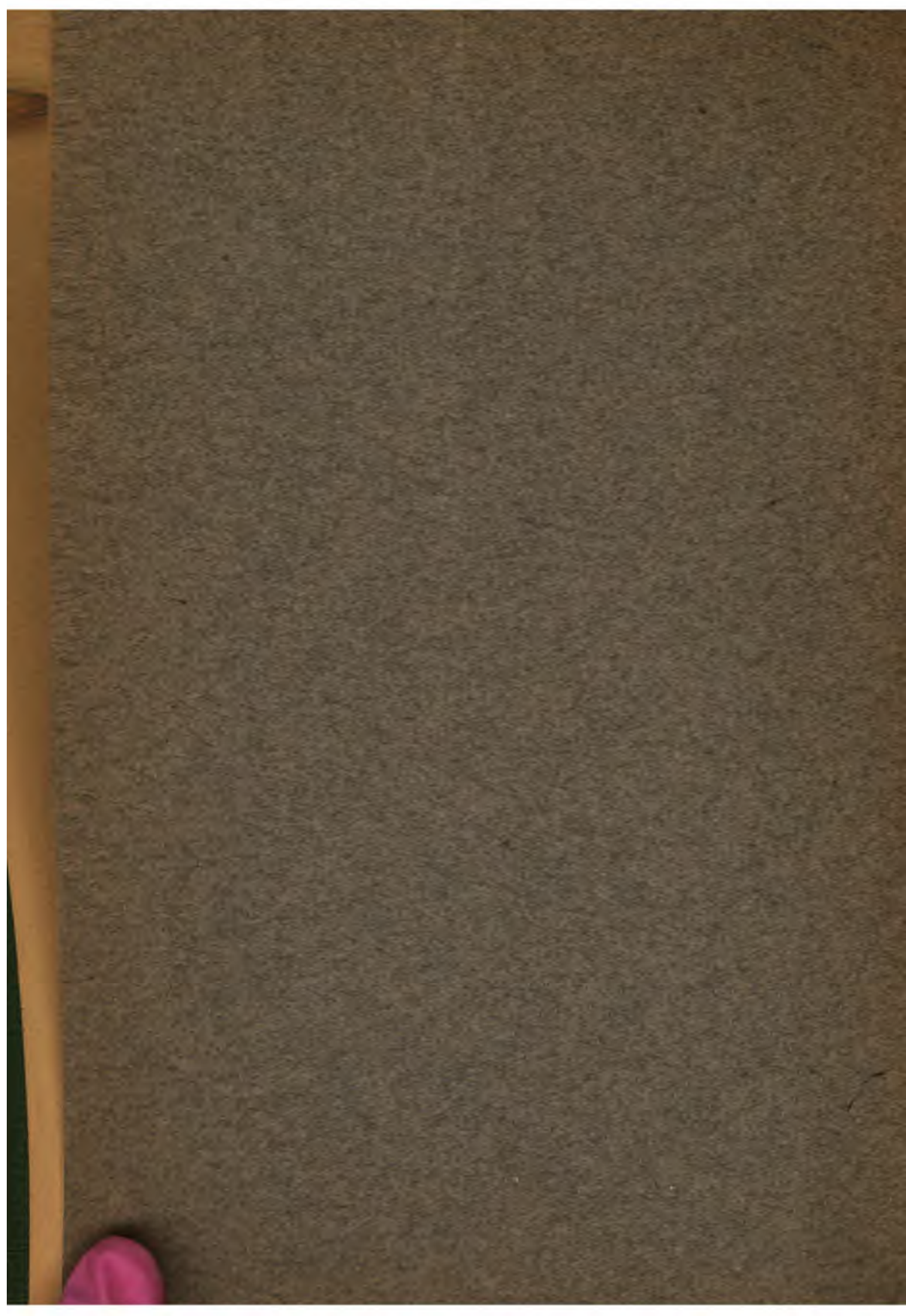
THIRD ANNUAL REPORT

OF THE

HENRY PHIPPS INSTITUTE

FOR THE STUDY, TREATMENT, AND
PREVENTION OF TUBERCULOSIS

February 1, 1905, to February 1, 1906



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February 1, 1905, to February 1, 1906

AN ACCOUNT OF THE WORK OF THE THIRD YEAR, A CONTINUATION OF THE REPORT
ON THE MARAGLIANO SERUM TREATMENT, A STATISTICAL STUDY OF THE
INFLUENCE OF THE HENRY PHIPPS INSTITUTE ON THE DEATH-RATE
FROM TUBERCULOSIS IN PHILADELPHIA, AND A REPORT OF
SOME OF THE SCIENTIFIC WORK DONE BY MEMBERS OF
THE STAFF OF THE INSTITUTE DURING THE YEAR

EDITED BY JOSEPH WALSH, A.M., M.D.

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MAZÝCK P. RAVENEL, M.D.

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GEORGE W. NORRIS, M.D.
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JOHN M. CRUCE, M.D.
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SAMUEL McCLARY III, M.D.
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Pathologist,

C. Y. WHITE, M.D.

Neurologist,

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HENRY TUCKER, M.D.

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LEONARD PEARSON.

Honorary Fellows,

EDWARD L. TRUDEAU, M.D.

EDOARDO MARAGLIANO, M.D.

L. SIMS WOODHEAD, M.A. (Cantab.), M.D. (Edin.).

CLINICAL WORK OF THE YEAR.

The work which forms the basis of the Third Annual Report of the Henry Phipps Institute, like that which formed the basis of previous reports, has been done in temporary quarters, with all the drawbacks and inconveniences of inadequate machinery. This fact is here set forth in the beginning, not as an apology, but for the purpose of giving a proper gage by which to measure the work.

The number of patients which forms the basis of this report is smaller than that of the preceding year, which in turn was smaller than that of the first year. The number of men engaged in the work of the Institute during this year is in the same ratio larger than that for the preceding years, as the number of patients is smaller. There is a proportionate improvement in the scientific work.

In this connection it may not be amiss to mention the fact that the Institute is a scientific as well as a charitable institution, and that the poor people who are its beneficiaries, in turn contribute something to the public good by serving as the material for scientific study. In a sense they are part of the Institute, and are entitled to a share of the credit for work done.

The Institute still maintains the same number of beds for advanced cases as from the beginning, and continues its dispensary, educational, and laboratory work along lines originally laid down. The beds are always full, and usually there is a long waiting list. Although the dispensary service has been increased to the fullest capacity of the present building, there has been a

waiting list almost continuously from the first day the dispensary was opened.

The educational work of the Institute consists principally of what is accomplished through the Annual Report; although, in addition to this, members of the staff give lectures on the various phases of tuberculosis, especially the preventive side, and nurses are sent out to the dispensary patients and their families to instruct them in methods of prevention. The Institute also participates in exhibits for educational purposes whenever the opportunity presents itself, and for this purpose has prepared an excellent pathological museum.

Facilities for laboratory work in the Institute, owing to its occupation of temporary quarters, have been primitive and inadequate; nevertheless, some good work has been done. The foundation has been laid for work which promises a rich harvest in the future. Of what has been done, so far only preliminary reports can be made.

During the year twelve hundred and fifty-one patients were admitted for treatment. Of these, six hundred and fifty-five were new tuberculous cases, and one hundred and twenty-four were new non-tuberculous, or unsuitable cases; four hundred and seventy-two were old cases, of which four hundred and fifty-five were tuberculous, and seventeen were non-tuberculous, or unsuitable.

Reports will be made on tuberculous cases only, except in the matter of nativity, in which a report will be made on the non-tuberculous and unsuitable as well. Non-tuberculous cases are admitted to the Institute for examination, and are rejected after the diagnosis has been established. This sometimes takes weeks and months. Unsuitable cases are such as are found to be well enough off to pay for treatment, and are sent away as soon as such a record has been established. No patient is treated at the Institute who can afford to pay a physician even a small fee.

New subjects for statistics have been introduced in this re-

port in addition to those reported on in previous years. As far as possible they have been put in the places where they logically belong, with a view of making the picture of what tuberculosis means as complete as possible. In matters previously reported on, a summary is given of statistics taken from the beginning. Relevant comments will be made on these statistics, and where possible, conclusions will be drawn from them. A brief statement of the principles of treatment used at the Institute will be given under headings of tables giving the most prominent symptoms and complications of tuberculosis.

NATIVITY.

New cases,...	Native born,.....	389	655	}	Admitted for treatment during the year, 1251		
	Foreign born (males),.....	153					
	Foreign born (females),.....	110					
	No record,.....	3					
	Non-tuberculous or unsuit- able, ...	124					
Old cases,...	Tuberculous, ...	455	472	}			
	Non-tuberculous or unsuit- able, ...	17					
Summary for three years,	Native born,.....	1767	2999	}	Admitted for treatment during the three years, 3886		
	Foreign born (males),.....	709					
	Foreign born (females),.....	488					
	No record,.....	35					
	Non-tuberculous, unsuitable, and undiagnosed, ...	887					
	Duplicates, ...	8					
	Number added by correction, ...	1					
	Highest number registered,.....	3895					

FOR THIS YEAR.
TUBERCULOUS.

	<i>Personal Nativity.</i>	<i>Ancestral Nativity.</i>
America,.....	393	193
Africa,.....	0	0
Austria,.....	15	17
Belgium,.....	0	0
Bohemia,.....	0	0
British Columbia,.....	0	0
British Guiana,.....	0	0
Canada,.....	0	0
Cuba,.....	0	0
China,.....	0	0
Denmark,.....	2	2
England,.....	23	31
East Indies,.....	0	0
France,.....	3	4

FOR THREE YEARS.
TUBERCULOUS.

	<i>Personal Nativity.</i>	<i>Ancestral Nativity.</i>
	1771	941
	0	8
	69	76
	1	1
	0	1
	1	0
	2	1
	6	2
	2	3
	1	1
	3	4
	104	131
	1	0
	9	12

NATIVITY.—(Continued.)

	FOR THIS YEAR.		FOR THREE YEARS.	
	TUBERCULOUS.		TUBERCULOUS.	
	<i>Personal Nativity.</i>	<i>Ancestral Nativity.</i>	<i>Personal Nativity.</i>	<i>Ancestral Nativity.</i>
Germany,.....	32	62	152	282
Greece,.....	1	1	1	1
Hungary,.....	2	2	16	16
Ireland,.....	50	141	284	741
Italy,.....	16	19	76	87
Jamaica,.....	0	0	1	0
Newfoundland,.....	0	0	5	5
Norway,.....	2	3	7	8
Nova Scotia,.....	0	0	1	2
Poland,.....	1	2	9	13
Portugal,.....	0	0	1	1
Roumania,.....	9	9	35	35
Russia,.....	93	104	349	377
Scotland,.....	8	9	29	34
Spain,.....	0	1	1	2
Sweden,.....	2	2	12	13
Switzerland,.....	0	1	5	6
Syria,.....	0	0	3	4
Turkey,.....	0	0	1	1
Wales,.....	0	0	4	3
West Indies,.....	2	0	4	4
Unknown,.....	1	4	33	39

MIXED PARENTAGE.

	FOR THIS YEAR.	FOR THREE YEARS.
	TUBERCULOUS.	TUBERCULOUS.
America-Canada,.....	0	14
America-England,.....	4	15
America-Germany,.....	7	15
America-Ireland,.....	16	50
America-Holland,.....	1	2
America-France,.....	0	1
America-Norway,.....	0	1
America-Roumania,.....	0	1
America-Scotland,.....	4	5
America-Wales,.....	1	2
America-West Indies,.....	2	2
Cuba-America,.....	0	1
Denmark-Norway,.....	0	1
England-Ireland,.....	5	19
England-Scotland,.....	0	2
England-Wales,.....	0	1
England-Newfoundland,.....	0	1
Germany-Ireland,.....	1	3
Germany-France,.....	0	1
Germany-Switzerland,.....	1	1
Ireland-Switzerland,.....	0	1
Scotland-Ireland,.....	3	12
Scotland-Wales,.....	0	1
Scotland-France,.....	1	1
Spain-France,.....	0	1
Sweden-Mexico,.....	0	1
Wales-Ireland,.....	2	2

During the first year 55.41% of all applicants for treatment were native born; and 60.97% of those who were treated for tuberculosis were native born. During the second year 58.98% of those treated for tuberculosis were native born; and during the third year 59.39% of those treated for tuberculosis were native born. For the three years 58.92% of the patients treated for tuberculosis were native born. From these figures it will be seen that foreign-born citizens bring us nearly one-half the burden of the crusade against tuberculosis. Strange to say, foreign-born men give us nearly twice the burden of foreign-born women.

The countries which send us the heaviest burdens in this regard are, in order of sequence, Russia, Ireland, Germany, England, Italy, Austria, and Scotland. The same order holds good for the burden which comes to us from the second generation, namely, the children born of immigrants. Only 31.37% of all tuberculous patients treated were of native ancestry one generation back.

Children born of mixed parentage most frequently became a burden when the union of parents was between Irish and native born; and next in frequency when the union was between Irish and English. The offspring of unions between Irish and Scotch, Irish and German, Irish and Welsh, and even Irish and Swiss, became burdens more frequently than the offspring of unions between persons of other nationalities. Unions between Americans and English, and between Americans and Germans gave a fair number of cases, but fewer than those unions in which one of the parents was Irish. No one has applied for treatment during the three years who is the offspring of a union between a Russian and a native of another country. This may be due in part to the reluctance of orthodox Jews, to which race most of the Russians who have come for treatment belong, to intermarry with people outside of their own religion. The offspring of unions in which both parents were Russian, however, furnished more cases than the offspring of any other foreign people.

RACE.

Celt,.....	223	} 655
Teuton,.....	185	
Jew,.....	110	
Latin,.....	27	
Slav,.....	22	
Mixed,.....	55	
Negro,.....	33	
No record until this year.		

With a view of throwing some light upon the question of racial immunity we have during the past year taken statistics on race. These statistics are based upon ancestry and not upon place of nativity. The Celtic race leads, the Teutonic comes next, and the Hebrew race is third on our list. In estimating the value of these statistics, the difficulty of getting accurate information upon this subject must be kept in mind. The Hebrew race stands out prominently, others are determined through remote ancestry.

One of the striking features which comes out in this table is the prevalence of tuberculosis in the Hebrew race. It would be difficult to determine accurately, at the present time, what percentage of the population of Philadelphia is of the Hebrew race, as the Hebrew element of our population is a growing one. Some allowance must also be made for the poverty of the Russian Hebrews on account of their persecutions and down-trodden condition before coming to this country. With all these points in mind, however, the percentage of tuberculosis among the Hebrews seems to be very large.

Many Hebrew physicians have claimed that tuberculosis does not exist to any great degree among the Hebrews, and this view is backed up by them with mortality statistics in large cities. The work at the Phipps Institute gives some explanation of the discrepancy between the views that have been published upon this subject and the views expressed here. Tuberculosis is very prevalent among the Hebrews, but infrequently takes on a fatal form. There seems to be a racial immunity against the toxin of the tubercle bacillus, but not against its growth.

RESIDENCE.

New cases, ...	{ Philadelphia,.....	590	} 655
	{ Pennsylvania,.....	30	
	{ Other States,.....	34	
	{ No record,.....	1	
Summary for three years,.....	{ Philadelphia,.....	2767	} 2999
	{ Pennsylvania,.....	135	
	{ Other States,.....	93	
	{ No record,.....	4	

The Phipps Institute is located in the slum district in Philadelphia, and draws most of its patients from this locality. About 10% of its patients come from outside of the city, and of this number one-half come from outside of the State of Pennsylvania. Of the patients who come from outside of the city, many go in to the hospital. There is inadequate provision everywhere for advanced consumptives, and as a consequence applications for admission into the hospital come from all parts. Admission is strictly in the order of application, and applications are received from any part of the country. Dispensary patients from outside of the State usually come for an expert opinion and often do not make a second visit.

CHANGE OF RESIDENCE.

Number of patients,...	New cases, 655..	Who changed place of residence,.....	628	{ Aggregate number of changes, 2818 Average number of changes, 4.48
		Who did not change place of residence,.....	2	
		Of whom no record was made as to change of residence,.....	25	
	Summary for two years, 1540....	Who changed place of residence,.....	1130	{ Aggregate number of changes, 3889 Average number of changes, 3.44
		Who did not change place of residence,.....	173	
		Of whom no record was made as to change of residence,.....	237	
	No record on first year's cases.			

As will be seen by a comparison of the changes for the year with the summary of changes for two years, the average number of changes has materially increased. Relatively fewer patients, too, have retained the same residence for the year. All of this, no doubt, is due to increased objection on the part of landlords to consumptive tenants.

The frequency with which residence is changed by the consumptive poor constitutes a menace to public health, and furnishes a strong argument in favor of registration of tuberculosis. Disinfection of houses when vacated by consumptives, whether by death or removal, should be practised everywhere. The burden of this disinfection ought to be borne in part by the community and in part by the landlord. The landlord should be compelled to assume part of the responsibility as a deterrent against the ejection of the consumptive tenant. Society owes its afflicted members some protection against unfounded fear and inhuman greed, and ought to put a penalty of some kind upon eviction of a tenant on account of disease.

Objection to registration of tuberculosis frequently is based upon a regard of the rights of the individual and sympathy for the poor consumptive. Unfortunately, they who object for these reasons know only a part of the facts in the case, and are misled by false premises. Registration of tuberculosis is necessary for the protection of the weak, afflicted poor against the heartlessness of the strong, unsympathetic well-to-do. The poor consumptive already is beyond the pale of rights. His rights were wrenched from him when he got the disease. His inalienable right of protection of life was violated when he was driven by conditions over which he had no control into an environment which gave him the disease and fostered its growth. Registration cannot save him; but it can save those who are near and dear to him from a similar fate. The objects which can be obtained by registration are: first, to educate and help the consumptive and his family; second, to protect the people against the danger from contaminated houses into which they may innocently move.

HOUSING.

Number of patients	{	Who lived in apartment houses,.....	160	}	655 new cases.
		Who lived privately,.....	460		
		No record,.....	35		
	{	Who lived in apartment houses,.....	328		Summary for three years, 1999
		Who lived privately,.....	887		
		No record,.....	1784		

Large number of "no records" due to fact that no detailed record was made during most of the first year.

The table on "character of the streets on which the patients lived" has been omitted from this report and will be left out of future reports. It was found to be of insufficient value to warrant the labor and time spent upon it.

Philadelphia is a city of homes; and apartment houses, in the true sense of that word, for the poor do not exist in large numbers. Most of the houses which are set down in the table as apartment houses are ordinary dwelling-houses, occupied by more than one family. These houses have plenty of free air space around them, but are cramped and ill adapted to the use to which they are put. In a sense, they are more unsanitary than regular apartment houses in most crowded districts in other cities. Plumbing and water-supply in them are, as a rule, very bad. In some of these houses whole families live in one or two rooms.

HOUSEHOLD CONDITIONS.

Number of patients of whom record was made as to the number of persons in the household,.....	610	{	Total number in household,.....	3562	}	Out of 655
			Average number in household,.....	5.83		
Number of patients of whom record was made as to the number of sleeping rooms used by the family,.....	617	{	Total number of sleeping rooms,.....	1935	}	Out of 655
			Average number of sleeping rooms,.....	3.13		
Number of patients of whom record was made as to the number of beds used by the family,....	602	{	Total number of beds, ...	2119	}	Out of 655
			Average number of beds, ..	3.51		

No record in previous reports.

The statistics given in this table have been gathered partly by the physician and partly by the inspectress. The household con-

ditions as here reported are pretty good when taken as a whole. They do not indicate overcrowding, either as to the number of people in the house; as to the number of people in a single room; or, as to the number of people sleeping in one bed. In some ways the table is misleading, however, for it completely wipes out the really bad side of the housing in Philadelphia in the general average. The only item in which the table gives anything like a correct idea of the unfavorable side of the case is in the average number of beds per family, and yet even this is not extremely bad. Every consumptive should, for good reasons, have a bed for himself, and if possible a room for himself.

AGE.

New cases, ...	Under 10 years,.....	15	} 655
	10 to 20 years,.....	104	
	20 to 30 years,.....	206	
	30 to 40 years,.....	194	
	40 to 50 years,.....	100	
	Over 50 years,.....	35	
	No record,.....	1	
Summary for three years,.....	Under 10 years,.....	57	} 2999
	10 to 20 years,.....	369	
	20 to 30 years,.....	945	
	30 to 40 years,.....	899	
	40 to 50 years,.....	487	
	Over 50 years,.....	233	
	No record,.....	9	

Consumption knows no distinction of age, as it knows no predilection of time or place. It occurs in the new-born babe and in the tottering old man. It seeks its victims in every age-period, but finds more at some periods of life than at others. The largest number dies at the age-period between twenty and forty, but this is because more people live at this age-period than at any other. In proportion to the number of people living, more people die of the disease at the age-period above fifty than at any other time. There is good reason for all this. Tuberculosis is a very slow disease, and fatal termination depends upon a great many secondary causes. These secondary causes come into play more frequently as life goes on, in some earlier, in some later, but always

in an increasing ratio of frequency with advancing age. The probabilities are, in the light of our present knowledge, that most cases of tuberculosis are implanted early in life, but that the disease manifests itself by ill health and death only later on, when the exigencies of life give the proper conditions.

SEX.

New cases,.....	{ Male,..... 367 Female,..... 288 }	655
Summary for three years,.....	{ Male,..... 1734 Female,..... 1265 }	2999

During the three years of work at the Henry Phipps Institute, upon which the present report is based, more than 33% more men have applied for treatment than women. This is true both of the dispensary and of the hospital. Two deductions may be drawn from these facts, namely, that more men than women have tuberculosis, and that men when they have tuberculosis become dependent more frequently than women. The greater frequency of tuberculosis among men than among women has been established by statistics the world over, and the figures here merely corroborate what has been accepted as the truth. Whether men become helpless and dependent on charity more readily than women, remains to be determined. In these statistics, so far as the hospital department is concerned, the preponderance of men over women can be explained satisfactorily by the existence of the Chestnut Hill Home for Consumptives within the limits of the city of Philadelphia, which admits women only, this Home having about fifty-one beds. The preponderance of men over women seeking treatment in the dispensary may in part be due to the greater ease with which men can go to the dispensary than women. It may be, too, that in the family there is greater reluctance to let the women become dependent upon charity than the men. From a sociological point of view the problem is an interesting one, but the facts here given are only suggestive.

SOCIAL CONDITION.

New cases,.....	{ Single,.....	280	} 655
	{ Married,.....	295	
	{ Widowed,.....	52	
	{ Separated,.....	20	
	{ No record,.....	8	
Summary for three years,.....	{ Single,.....	1227	} 2999
	{ Married,.....	1457	
	{ Widowed,.....	285	
	{ Separated,.....	20	
	{ No record,.....	10	

According to the United States Census Report, death occurs more frequently from consumption among single people than among married people for the same age-period. The relative frequency, according to the census of 1900, is 309.8 single male deaths for every one hundred thousand single males living, and 225.2 single female deaths for every one hundred thousand single females living; as against 215.5 married male deaths for every one hundred thousand married males living, and 216.4 married female deaths for every one hundred thousand married females living, during the age-period from fifteen years upwards. The death-rate from consumption among the widowed is still very much higher than among the single. In our table of the summary for three years, if we add the number of widowed and separated individuals to the single ones, it will about equal the number of married ones. In the light of these statistics it would seem that married people become a public charge much more frequently than single people.

COLOR.

New cases,.....	{ White,.....	619	} 655
	{ Black,.....	33	
	{ Yellow,.....	0	
	{ No record,.....	3	
Summary for three years,.....	{ White,.....	2810	} 2999
	{ Black,.....	184	
	{ Yellow,.....	1	
	{ No record,.....	4	

About 5% of the population of Philadelphia is colored. The

death-rate from consumption among colored people throughout the United States is more than twice that among white people. Since the Institute began its work, a little over 6% of its beneficiaries have been of the colored race. The natural deduction from this would be, either that in Philadelphia the morbidity from tuberculosis among colored people is less than it is among colored people in the whole United States, or that poverty among colored people is less than among the whites. Neither of these deductions can be accepted. The probabilities are that colored people endure much greater poverty and distress without seeking aid than do white people, and that herein lies the explanation of the discrepancy between our figures and those of the United States Census Report.

THE EYES.

Number of patients who had	Dark eyes,.....	254	655	New cases
	Light eyes,.....	371		
	No record of color,.....	30		
Pupils dilated,.....	129	655		
	Pupils not dilated,.....		246	
	No record of condition of pupils,.....		280	
Pupils unequal,.....	27	655		
	Pupils equal,.....		446	
	No record of equality,....		182	
Dark eyes,.....	498	2999	Summary for three years	
	Light eyes,.....			645
	No record of color,.....			1856
Pupils dilated,.....	343	2999		
	Pupils not dilated,.....			645
	No record of condition of pupils,.....			2011
Pupils unequal,.....	69	2999		
	Pupils equal,.....			1174
	No record of equality,....			1756

Large number of "no records" due to fact that no detailed record was made during most of first year.

The color of the eyes is a fair indication of the complexion, but not always an accurate one. Some claim that dark complexioned people are more prone to tuberculosis than light-complexioned ones, and others claim that the reverse is true. As yet we have no data upon the subject which will warrant even a

hypothesis. As far as our statistics go, the light-complexioned people exceed the dark-complexioned people by over 20%; but it must be borne in mind that many of our patients are foreign born, who come from the north of Europe, where the majority of people are light-complexioned.

Dilated pupils have occurred in about one-third of the patients of whom a record has been made as to the condition of the pupils. Unequal pupils have been recorded infrequently. Much has been made of the condition of the pupils in tuberculosis by some writers, and statistics are here presented with a view of getting some light upon the subject. So far, we can draw no conclusions. We do not even yet know to what the phenomenon is due. Usually it is ascribed to muscular weakness.

HEIGHT.

Males who were..	$\left\{ \begin{array}{l} \text{Five feet eight inches or under,} \dots 206 \\ \text{Over five feet eight inches,} \dots\dots\dots 135 \\ \text{No record of measurements,} \dots\dots\dots 26 \end{array} \right\}$	367	} 655 new cases
Females who were..	$\left\{ \begin{array}{l} \text{Five feet four inches or under,} \dots\dots 158 \\ \text{Over five feet four inches,} \dots\dots\dots 114 \\ \text{No record of measurements,} \dots\dots\dots 16 \end{array} \right\}$	288	
Males who were..	$\left\{ \begin{array}{l} \text{Five feet eight inches or under,} \dots\dots 378 \\ \text{Over five feet eight inches,} \dots\dots\dots 404 \\ \text{No record of measurements,} \dots\dots\dots 70 \end{array} \right\}$	852	} Summary for two years, 1540
Females who were..	$\left\{ \begin{array}{l} \text{Five feet four inches or under,} \dots\dots 285 \\ \text{Over five feet four inches,} \dots\dots\dots 328 \\ \text{No record of measurements,} \dots\dots\dots 75 \end{array} \right\}$	688	

No record made first year.

The average height of males of all nationalities is a little over five feet five inches. The average height of the native male of the United States is something less than five feet eight inches. The average height of the English female is a little less than five feet three inches, and the average height of the female of the United States, according to Bowditch, is a little less than five feet two inches. Compared with these averages, people who applied for treatment at the Phipps Institute are, in the majority of instances, taller than normal. The statistics of the Institute therefore lend strength to the theory that abnormal height predisposes to tuber-

culosis. Too much must not be made of these figures, however, as the number of cases in which measurements have been taken and are here presented is too small to permit of deductions.

GENERAL APPEARANCE.

Number of patients whose general appearance was.....	Good,.....	334	} 655 new cases
	Bad,.....	302	
	Not recorded,.....	19	
	Good,.....	704	} Summary for two years, 1540
	Bad,.....	780	
	Not recorded,.....	56	

No record on first year's cases.

Of the new patients treated during the year, the majority showed good general appearance. A larger number showed a good general appearance this year than the previous year. This no doubt is due to popular education in feeding consumptives. It is surprising how well even an advanced consumptive may look if he is properly fed.

A comparison of this table with the table showing the tissue involved brings out this fact very forcibly. Three-fourths of the patients treated had both lungs involved; hence many with both lungs involved must have looked well.

OCCUPATION.

FOR THE CURRENT YEAR.			TOTAL FOR THREE YEARS WHEN DISEASE WAS CONTRACTED.	FOR THE CURRENT YEAR.			TOTAL FOR THREE YEARS WHEN DISEASE WAS CONTRACTED.
Occupation when disease was contracted.	Occupation while treated.			Occupation when disease was contracted.	Occupation while treated.		
Abattoir employee,...	0	0	1	Baseball player,.....	0	0	1
Actor,.....	0	0	1	Blacksmith,.....	2	0	14
Agent,.....	0	0	7	Boilermaker,.....	3	1	14
Amusement hall keeper,.....	3	0	3	Bookbinder,.....	2	0	10
Attendant in insane asylum,.....	0	0	1	Bookkeeper,.....	2	0	7
Baker,.....	1	0	15	Bootblack,.....	0	0	1
Barber,.....	4	2	22	Bowling alley attendant,.....	1	0	2
Bartender,.....	5	0	22	Boxmaker,.....	4	1	17
				Brakeman,.....	1	0	8

OCCUPATION.—(Continued.)

FOR THE CUR- RENT YEAR.			TOTAL FOR THREE YEARS WHEN DISEASE WAS CONTRACTED.	FOR THE CUR- RENT YEAR.			TOTAL FOR THREE YEARS WHEN DISEASE WAS CONTRACTED.
Occupation when disease was con- tracted.	Occupation while treated.			Occupation when disease was con- tracted.	Occupation while treated.		
Brass grinder,.....	1	0	1	Foundryman,.....	0	0	6
Brass polisher,.....	0	0	3	Foreman (Mill),.....	1	0	1
Brewery hand,.....	0	0	3	Gardener,.....	0	0	3
Brick layer,.....	5	1	13	Gas works employee,...	1	0	2
Brick maker,.....	0	0	2	Glass blower,.....	2	1	10
Bridge builder,.....	1	0	4	Glass-factory hand,...	1	0	2
Brush maker,.....	0	0	2	Glazier,.....	0	0	1
Business man,.....	1	1	1	Gold preparer,.....	1	0	1
Butcher,.....	1	0	9	Grocer,.....	2	0	2
Cabinet maker,.....	4	1	11	Harness-maker,.....	0	0	1
Candy maker,.....	5	0	5	Hospital orderly,.....	0	0	1
Canvasser,.....	0	0	4	Hostler,.....	1	0	4
Cap maker,.....	1	0	5	House-worker,.....	144	124	688
Car conductor,.....	1	2	17	Huckster,.....	4	3	13
Carpenter,.....	13	5	42	Ice-cream vender,....	0	0	1
Carriage maker,.....	0	0	1	Iceman,.....	0	0	4
Cementer,.....	0	0	2	Ice manufacturer,....	0	0	1
Chambermaid,.....	1	0	5	Inspector,.....	3	1	3
Chemist,.....	0	0	1	Iron worker,.....	15	1	34
Child's nurse,.....	0	0	2	Janitor,.....	0	0	2
Cigar maker,.....	9	4	46	Jeweler,.....	0	0	1
Clerk,.....	15	7	86	Labeller,.....	1	0	1
Cloth examiner,.....	0	0	1	Laboratory employee,.	0	1	1
Coalyard employee,...	0	0	1	Labor boss,.....	0	0	1
Collector,.....	1	1	5	Laborer,.....	13	2	156
Color mixer,.....	0	0	1	Laundry worker,.....	4	2	26
Cook,.....	7	5	19	Leather worker,.....	2	0	12
Cooper,.....	1	0	7	Letter carrier,.....	1	2	2
Coppersmith,.....	0	0	1	Librarian,.....	0	0	1
Courier,.....	0	0	1	Lineman,.....	1	0	1
Designer,.....	0	0	1	Lumberyard employee,.	1	1	4
Dish washer,.....	1	0	1	Lock worker,.....	1	0	1
Draughtsman,.....	0	0	1	Longshoreman,.....	3	0	3
Dressmaker,.....	8	0	8	Machinst,.....	19	6	62
Driver,.....	16	7	83	Marble worker,.....	1	0	2
Druggist,.....	0	0	1	Mechanic,.....	0	0	5
Dyer,.....	2	3	17	Merchant,.....	0	0	15
Electrical worker,....	1	0	7	Messenger boy,.....	1	0	3
Elevator employee,...	1	0	7	Metal worker,.....	0	1	3
Emery-wheel worker,.	0	0	2	Mill hand,.....	16	10	116
Engineer,.....	1	0	13	Milliner,.....	2	0	9
Engraver,.....	0	0	3	Milk-man,.....	1	0	1
Factory hand,.....	45	13	127	Millwright,.....	0	0	1
Farmer,.....	2	1	11	Miner,.....	6	1	16
Fireman,.....	2	1	8	Molder,.....	0	0	10
Fish cleaner,.....	0	0	1	Morocco finisher,....	4	1	13
Florist,.....	1	0	4	Musician,.....	1	0	4

OCCUPATION.—(Continued.)

FOR THE CUR- RENT YEAR.			FOR THE CUR- RENT YEAR.		
Occupation when disease was con- tracted.	Occupation while treated.	TOTAL FOR THREE YEARS WHEN DISEASE WAS CONTRACTED.	Occupation when disease was con- tracted.	Occupation while treated.	TOTAL FOR THREE YEARS WHEN DISEASE WAS CONTRACTED.
Masseur,.....	0	1	Shirt-maker,.....	0	7
Motorman,.....	1	1	Shoemaker,.....	3	22
Mover,.....	0	1	Signalman,.....	0	1
Navy employee,.....	0	4	Soldier,.....	2	5
Newspaper vender,....	0	3	Spiceroom worker,....	0	1
Nickel plater,.....	0	1	Spring maker,.....	1	1
Nurse,.....	0	6	Stage hand,.....	0	1
No occupation,.....	14	56	Stand keeper,.....	4	4
Odd jobs,.....	1	1	Stenographer,.....	2	9
Office boy,.....	6	8	Stereotyper,.....	1	1
Officer Salvation Army, 1	0	2	Stevedore,.....	4	14
Oil cloth worker,.....	1	1	Stoker,.....	0	2
Oil works employee,....	0	2	Stone-cutter,.....	3	18
Operator,.....	8	8	Storekeeper's employee, 2	0	14
Organ builder,.....	0	1	Street cleaner,.....	1	1
Oyster man,.....	1	4	Student,.....	0	11
Packer,.....	4	15	Suspender maker,.....	1	1
Painter,.....	7	29	Tailor,.....	16	96
Paperhanger,.....	2	13	Teacher,.....	1	8
Peddler,.....	6	19	Teamster,.....	7	7
Pen maker,.....	3	3	Telegraph operator,....	1	3
Photographer,.....	0	2	Telephone operator,....	2	4
Plasterer,.....	0	7	Tin plater,.....	2	8
Pipe cutter,.....	1	1	Tin roofer,.....	1	6
Plaster-of-Paris worker, 0	0	1	Tool sharpener,.....	0	1
Plumber,.....	2	18	Turkish bath att'd,....	0	1
Policeman,.....	0	2	Truss-maker,.....	0	1
Poolroom attendant, ..	0	1	Type-polisher,.....	0	1
Porter,.....	3	18	Type-setter,.....	4	4
Potter,.....	0	2	Type-writer,.....	0	1
Presser,.....	3	16	Upholsterer,.....	1	11
Printer,.....	8	27	Undertaker,.....	0	1
Ragsorter,.....	3	8	Violin maker,.....	0	1
Rigger,.....	4	8	Waiter,.....	6	40
Reporter,.....	1	1	Watchman,.....	2	9
Riveter,.....	0	3	Watchmaker,.....	0	4
Rubber maker,.....	1	1	Washerwoman,.....	0	9
Sailor,.....	2	9	Weaver,.....	14	64
Salesman,.....	7	23	Wet nurse,.....	1	1
Saleswoman,.....	5	19	Wheelwright,.....	0	3
Sawyer,.....	0	3	Wine-dealer,.....	0	1
School-child,.....	35	115	Wood-worker,.....	2	12
Scrubber,.....	0	3	Wood-chopper,.....	0	1
Scissors-grinder,.....	0	1	Woolsorter,.....	0	1
Seamstress,.....	9	51	No occupation given,...	5	63
Sewing mach. operator, 0	0	12			
Shipper,.....	0	1			
			655	655	2999

In this year's occupation table we give the occupation when the disease was contracted and the occupation when the patient was under treatment. The purpose of this is to also bring out the occupations which consumptives follow while the disease is active. From a sociological point of view this is of importance, and from a preventive point of view it is of the greatest importance.

Many useful lessons can be read out of this table, some not very flattering to our civilization. Nearly one-half of the patients followed some occupation while under treatment. Inasmuch as three-fourths of them had the disease fairly advanced, quite a number must have been working whilst quite ill and during the contagious period of the disease. The table on pain will show that many of them must have been suffering pain while working. Why they work can be read out of the table on income and sick benefits. Work is the alternative of starvation.

Is society doing its duty by these people? Sick horses are not permitted to work, and sick cats are carefully sought out and humanely cared for. Sick brothers and sisters, however, not only are permitted, but are compelled to work even at laborious occupations. How strange that there are no societies for the prevention of cruelty to human beings!

WORK.

New cases.....	{	Who worked indoors,.....	282	}	655
		Who worked outdoors,.....	23		
		Who did not work,.....	347		
		No record,.....	3		
Summary for two years.	{	Who worked indoors,.....	671	}	1540
		Who worked outdoors,.....	85		
		Who did not work,.....	732		
		No record,.....	52		

No record on first year's cases.

The majority of those who worked while undergoing treatment held positions within doors. This is from necessity. There are relatively few occupations which a consumptive can get and hold, and most outdoor occupations are too arduous. Not until convalescent farms on which such people can earn a living at

light work are available, will the working problem for the consumptive be solved. In the early stages, and after restoration to health in the more advanced stages, the consumptive is better occupied than idle, but he cannot compete with sound men and women in the ordinary labor market.

The Vacant Lot Society is trying to provide proper occupation for some of these people and should be heartily supported in this endeavor. Its methods are well adapted to help poor consumptives in cities.

EARNING CAPACITY OF PATIENTS.

Patients work- ing,.....	New cases, 655	Who were earning something,.....	286	Total earnings per day,.....\$442.56 Average earnings per day, \$1.547
		Who were earning nothing,.....	342	
	Summary for two years, 1540,.....	Of whose earnings no record was made,.....	27	Totals earnings per day,.....\$913.18 Average earnings per day,..... \$1.438
		Who were earning something,.....	635	
		Who were earning nothing,.....	557	
		Of whose earnings no record was made,.....	348	

No record on first year's cases.

The average earnings of consumptives, who are employed, are very low. They about amount to the average of the lowest paid labor in our country. Our table of occupations shows that the earnings of some must be above the average, since some of the occupations are those of skilled labor; the earnings of the remainder, therefore, must be below the average of even the lowest paid labor.

Unfortunately, the average earnings of consumptives are insufficient to purchase the food, bodily comforts, home comforts, and sanitary conditions for restoration to health or maintenance of health after it has been regained. This seriously complicates the problem of the cure of consumptives who are very poor. It explains, in a great measure, too, the instability of the results

obtained in sanatoriums for poor consumptives and points the way for philanthropy in the crusade against tuberculosis. The work, to be permanent and efficient, must go further than the sanatorium; something must be provided for the consumptive after he has left the sanatorium.

SICK BENEFITS.

Patients, 655.....	Who got sick benefits,...	68	{ Total benefits per week, \$385.05 Average benefits per week, ... \$5.66
	Who did not get sick benefits,.....	520	
	No record,.....	67	
Summary for two years, 1540.....	Who got sick benefits,....	156	{ Total benefits per week, \$777.53 Average benefits per week, ... \$4.98
	Who did not get sick benefits,.....	1183	
	No record,.....	201	

No record made on first year's cases.

The table here given sets forth in a very forcible way the inadequacy of our American provision for the inevitable idle day of our working people. Most of our working people become paupers as soon as they become incapacitated for work. This is not as it should be, and furnishes us with much food for thought and speculation as to the future. Can this evil be remedied, and what is the remedy? Have our insurance companies been fully alive to their business opportunities, and has our government given proper protection to the poor in insurance matters? These are questions which come up in one's mind when reviewing this problem. The question concerns the sociologist as well as the statesman.

DEPENDENTS.

New cases,.....	Who had others to support,.....	381	} 655
	Who did not have others to support,.....	250	
	Of whom there was no record as to others to support,.....	24	
Summary for two years,.	Who had others to support,.....	801	} 1540
	Who did not have others to support,.....	656	
	Of whom there was no record as to others to support,.....	83	

No record on first year's cases.

The majority of patients who came for treatment had others depending on them. Themselves incapacitated for the struggle against the vicissitudes of life by sickness and poverty, they had others looking up to them for the necessities of life. These dependents usually were children or old people. What sadder picture of human suffering can one conjure up than that of a starving child asking for bread from a starving, disease-stricken father? or of a heart-broken old man or woman accepting a morsel from a disease-stricken son or daughter?

SICKNESS IN THE HOME.

New cases	Who had others sick in the home,.....	55	} 655
	Who did not have others sick in the home, ...	257	
	Of whom no record was made as to others being sick in the home,.....	343	
Summary for two years	Who had others sick in the home,.....	130	} 1540
	Who did not have others sick in the home,.....	615	
	Of whom no record was made as to others being sick in the home,.....	795	

No record on first year's cases.

The record of sickness in the home here given is of such sickness only as incapacitates, and can be recognized by the layman. It does not include cases of incipient tuberculosis. The Institute at present is not equipped to carefully examine all inmates of the home of the consumptive who applies for treatment, with a view of determining how many have implantations of tuberculosis which have not yet manifested symptoms. The care of those who have tuberculosis in a disabling form has precluded such investigation, but later on it may be possible to collect data upon this subject.

ALCOHOLISM.

New cases,.....	Alcoholism in patient,.....	153	} Out of 655 cases
	No alcoholism in patient,.....	483	
	No record,.....	19	
	Alcoholism in preceding generation,..	166	
	No alcoholism in preceding generation,...	451	
	No record,.....	38	
Summary for three years,	No alcoholism in either patient or preceding generation,.....	375	} Out of 2999 cases
	Alcoholism in patient,.....	628	
	Alcoholism in preceding generation,..	579	

As our statistics on alcoholism in tuberculosis grow, it becomes more and more manifest that all extreme views upon this subject will have to be abandoned. That alcohol neither prevents nor cures tuberculosis is evident from the number of alcoholics who have come for treatment; and that it does not strongly predispose to the disease seems to stand out prominently from the vast preponderance of non-alcoholics among the applicants for treatment. Neither can it be read out of these figures that the children of alcoholics are more prone to tuberculosis than the children of non-alcoholics. It looks very much indeed as though the two arch-enemies of the human family, alcoholism and tuberculosis, will have to stand each on its own demerits, and be met by sociologists on independent bases. We will be able to fight these enemies better when we better understand them, and no longer formulate our plans of attack upon untruth.

PREVIOUS DISEASES.

New cases who gave a history of having had	{	Typhoid fever,.....	124	}	Out of 655 cases
		Pneumonia,.....	104		
		Pleurisy,.....	149		
		Influenza,.....	218		
		Measles,.....	416		
		German measles,.....	32		
		Mumps,.....	142		
		Chicken-pox,.....	148		
		Rickets,.....	14		
		Malaria,.....	103		
		Whooping-cough,.....	225		
		Smallpox,.....	32		
		Herpes zoster,.....	16		
		Scarlet fever,.....	104		
		Diphtheria,.....	56		
		Diabetes,.....	0		
		Epilepsy,.....	4		
		Marasmus,.....	33		
		Syphilis,.....	32		
		Gonorrhea,.....	100		
		Rheumatism,.....	123		
Gout,.....	0				
Vaccination,.....	547				
Summary for three years	{	Persons who gave a history of having had		{	Out of 2999 cases
		Typhoid fever,.....	525		
		Pleurisy,.....	733		
		Pneumonia, ..	562		

In this report we give a much longer list of previous diseases

than in the two preceding reports. The influence of one disease upon another becomes of greater and greater interest to the scientist with our growing knowledge about such matters, and the subject here opened up is a fertile one for research.

Some allowance will have to be made in these statistics for lapse of memory and errors of nomenclature on the part of patients. Cases of tuberculosis which run a short course with active symptoms, followed by temporary recovery or abeyance of the disease, are frequently mistaken for typhoid fever, hence some cases which have been reported as typhoid fever may have been cases of tuberculosis. The same thing applies to pneumonia and influenza.

The table as a whole gives a correct picture of the control which modern sanitation and preventive measures have obtained over intensely contagious diseases, which formerly were the birth-right of every one. Only 5% of all patients who have been treated during two years ever had smallpox. It is a well-known historical fact that before vaccination was practised 95% of the population got smallpox. The number of people who gave a record of having been successfully vaccinated is the logical complement of the number who had smallpox. The two numbers pretty nearly equal the number of patients who were treated.

Measles and whooping-cough evidently are still quite rampant. In the past little control has been exercised over them, but now they generally are placed upon the list of diseases subject to control. The future, no doubt, will show a better record.

SPINAL CURVATURE.

Patients who were recorded as having had	{	Spinal curvature,.....	153	}	655
		No spinal curvature,.....	463		
		No record of spinal curvature,.....	39		
No record until this year.					

Spinal curvature in persons suffering from tuberculosis is of interest from several view-points. Sometimes it is an indication of a previous attack of tuberculosis, and then it is of value in

studying the immunity of the individual. It may, however, also be due to lack of proper muscular development, and to malnutrition in early life. In such cases it is of value in trying to determine the influence of these conditions upon the implantation and development of tuberculosis. The table shows quite a large percentage of spinal curvature in persons who have developed tuberculosis.

ATROPHY OF THE SCAPULAR MUSCLE.

Number of patients who had the scapular muscle most atrophied	On the right side,...135 On the left side,... 52 On neither side,...443 No record,........ 25	655 new cases
Number of patients who had the scapular muscles most atrophied	On the right side,...317 On the left side,... 118 On neither side,...971 No record,........134	1540, summary for two years
No record taken on first year's cases.		

Atrophy of the scapular muscles in all probability is due, in most cases at least, to an attack of tuberculosis earlier in life, from which recovery has in part or in whole taken place. This at least is the most plausible explanation of it. With this thought in mind a comparison of this table with the table on place of beginning of tuberculosis of the lungs is of great interest, inasmuch as both tables point to the same conclusion in regard to place of beginning of tuberculosis of the lungs. It will be seen that the relative atrophy of the scapular muscles on the right side corresponds exactly to the beginning of tuberculosis in the upper lobe of the right lung. In both tables there is a preponderance in favor of the right side in the ratio of two to one.

CHILDHOOD.

Patients who had.....	Been breast-fed children,...498 Been bottle-fed children,... 43 No record,........114	655
	Been of good health during first five years of life,...451 Been of bad health during first five years of life,... 92 No record of health condition,...112	655
No record until this year.		

These statistics have been taken with a view of throwing light upon the mooted question, which is now engaging the attention of tuberculosis experts the world over, whether or not tuberculosis is implanted during infancy and lies dormant until brought into activity by a secondary cause, and also of showing the relationship of bovine tuberculosis to the spread of human tuberculosis.

As will be seen by the table, vastly the majority of the people who were treated for tuberculosis during the year were healthy during the first five years of life, and were breast-fed. It would seem probable, therefore, that the majority did not get tuberculosis during infancy, and if they did get an implantation during this time, did not get it from cow's milk. A much larger number of cases will have to be studied, however, before definite conclusions can be reached.

SOURCE OF CONTAGION.

New cases,.....	{	Preceding generation,.....	203	} Out of 655 cases
		Immediate generation,.....	180	
		Succeeding generation,.....	35	
		Consort's family,.....	17	
		Fellow employees,.....	122	
		Contaminated houses,.....	35	
		Source not discovered,.....	181	
		No record,.....	10	
		More than one source,.....	176	
Summary for three years,...	{	Preceding generation,.....	755	} Out of 2999 cases
		Immediate generation,.....	648	
		Succeeding generation,.....	99	
		Consort's family,.....	260	
		Fellow employees,.....	287	
		Contaminated houses,.....	147	
		Source not discovered,.....	1162	
		No record,.....	111	
		More than one source,.....	516	

With increased experience on the part of our examiners and with growth of our knowledge on the subject of contagion in tuberculosis, the number of cases in which the source of tuberculosis remains undiscovered diminishes. During the past year only a little over 25% remained undiscovered, as compared with about 40% for the three years.

It becomes more and more evident that family relationship is the most important factor in the spread of tuberculosis. Next to this comes association in employment, and third in order comes house infection. These deductions are in harmony with conclusions reached on the same subject along other lines of investigation.

As a corollary, comes a slight change in our views upon the relative part which wet sputum and dried sputum play in the spread of tuberculosis. We gradually are driven to the conviction that contamination of food with the sputum of consumptives while the sputum is still in a moist state must be reckoned with as a factor in the spread of tuberculosis, and that sputum in a dried, powdered form is somewhat less dangerous than we formerly believed it to be. The lesson to be drawn from all this is that sputum must be disposed of immediately when given off, in such a way that nothing can be contaminated.

GLANDS.

Patients who were recorded as having had enlarge- ment of.....	{	Cervical glands,.....	139	} Out of 655 cases
		Axillary glands,.....	82	
		Inguinal glands,.....	96	
		Cervical and axillary glands,...	22	
		Cervical and inguinal glands,..	29	
		Axillary and inguinal glands,..	13	
		Cervical, axillary, and inguinal glands,.....	24	
No record until this year.				

It is generally accepted at the present time that the tubercle bacillus gains entrance into the organism through the lymphatic system, whether the port of entry be the respiratory tract, the alimentary canal, the skin or any other part of the body. It is believed by some that the first onslaught is always upon a lymphatic gland, and that only after the bacillus has penetrated a gland can it enter other tissues of the body. This idea is in harmony with the conclusions of those pathologists who have found tuberculosis in the lymphatic glands of nearly all persons who come to the autopsy table from any cause whatsoever.

Our record of enlarged lymphatic glands is quite evidently out of harmony with the most recent histological findings. The explanation of this is to be found in the difficulty of making out enlargement of lymphatic glands in some subjects. We publish in this volume a special study of tuberculosis of orphaned children by Dr. W. T. Cummins, which throws some light upon this subject.

PLACE OF BEGINNING OF TUBERCULOSIS OF THE LUNGS.

New cases,.....	<table><tr><td>Right apex,.....</td><td>443</td></tr><tr><td>Left apex,.....</td><td>91</td></tr><tr><td>Not determined,.....</td><td>116</td></tr></table>	Right apex,.....	443	Left apex,.....	91	Not determined,.....	116	655*
Right apex,.....	443							
Left apex,.....	91							
Not determined,.....	116							
Summary for three years,.....	<table><tr><td>Right apex,.....</td><td>1903</td></tr><tr><td>Left apex,.....</td><td>673</td></tr><tr><td>Not determined,.....</td><td>418</td></tr></table>	Right apex,.....	1903	Left apex,.....	673	Not determined,.....	418	2999*
Right apex,.....	1903							
Left apex,.....	673							
Not determined,.....	418							

In the table for the year the place of beginning of tuberculosis of the lungs is assigned to the right apex even more disproportionately than during preceding years. For the three years the place of beginning is assigned to the right apex in nearly 66% of the cases. This finding is in harmony with the accepted views the world over. Usually the place of beginning is determined by the advancement of the lesions, but this method can readily lead to false conclusions.

Tuberculosis is a very chronic disease, and the more intimate our acquaintance with it, the longer the time which we assign to it for running its course. We also are beginning to find out that first attacks frequently are recovered from, and that the lung which has stood this first brunt after recovery has more resistance than the opposite lung. In this light it is quite conceivable that

*In 1905 there was one patient who had the glands only involved; one patient who had only the pleura involved; one patient whose lungs were not examined, though he showed tuberculosis of the larynx, both testicles, and the ischiorectal region; one patient who died a few hours after admission without a thorough examination, though the diagnosis pneumothorax had been made; one patient who remained only six days while physician was on vacation, and who was not examined, though her sputum showed tubercle bacilli.

the lung in which the disease is most advanced may not be the place of beginning of the disease, nor was it so determined in these statistics.

TISSUE INVOLVED.

New cases,.....	One lung,.....	171	} Out of 655 cases
	Both lungs,.....	455	
	Three lobes,.....	126	
	More than three lobes,.....	189	
	Intestines,.....	40	
	Mesenteric glands,.....	7	
	Reproductive organs,.....	3	
	Kidneys,.....	46	
Summary for three years,...	Other organs,.....	43	} Out of 2999 cases
	No record,.....	2	
	One lung,.....	865	
	Both lungs,.....	1824	
	Three lobes,.....	573	
	More than three lobes,.....	670	
	Other organs,*.....	458	
	No record,.....	283	

Tissue involved, as represented in this table, is that which was diagnosed during life, and therefore cannot be accepted as an accurate delineation of the disease. It may be safely said, however, that it always was less than the actual amount. This is particularly true in regard to other tissue than the lungs. Tuberculosis of the lungs is relatively easy to diagnose by a well-trained expert, but tuberculosis of intra-abdominal organs and deep lymphatic glands is very difficult to diagnose, and often baffles the best trained expert.

A good idea of the chronicity of tuberculosis can be gotten from this table, especially if one keeps in mind that the majority of the cases here tabulated not only came to the dispensary for treatment, but that many of them did hard work while coming. This table should be studied in connection with the table on duration of the disease.

* In 1905 there was a special report made on the involvement of the intestines, mesenteric glands, reproductive organs, and kidneys, which in 1903 and 1904 were placed under the head of "Other Organs."

DURATION OF THE DISEASE.

Number of cases,	{	New cases,.....	{	Less than 2 years,.....	298	} 655
				2 to 5 years,.....	218	
				5 to 10 years,.....	81	
				10 to 20 years,.....	40	
				Over 20 years,.....	7	
				No record,.....	11	
	{	Summary for three years,...	{	Less than 2 years,.....	1370	} 2999
				2 to 5 years,.....	943	
				5 to 10 years,.....	329	
				10 to 20 years,.....	201	
				Over 20 years,.....	48	
				No record,.....	108	

The duration of tuberculosis is an exceedingly difficult matter to determine on account of the chronicity of the disease, and its freedom from symptoms during the early stages. The table here given is based partly on the statements of the patients themselves, and partly on the judgment of the examiner after he has heard the story of the patient. In the nature of things it cannot be accurate, but nevertheless it gives a very good idea of what the duration of tuberculosis is.

A comparison of the table for the current year with the table giving the summary for the three years will show that the average duration of the disease is increasing as our examiners become more expert in taking histories. It is particularly noticeable that the number of people in whom the disease has existed for less than two years is diminishing.

Long duration of tuberculosis, other things being equal, is a favorable prognostic factor in the case, but cannot always be safely interpreted as such. For prognostic purposes, the length of duration should always be carefully compared with the amount of tissue destroyed. If the disease is of long duration, with little destruction of tissue, and with the formation of considerable fibrous tissue, the prognosis is favorable; and if the disease is of short duration, with much destruction of tissue, and with no fibrosis, particularly if there is fever, acceleration of the pulse, or other signs of acuteness, the prognosis is unfavorable.

TUBERCLE BACILLI IN SPUTUM.

Number of pa- tients,..	{	For this year, 655,.....	{	Recorded as having had sputum ex- amined ...	{	Once,... 360 More than once, .. 52	{	Bacilli present,..267 Bacilli absent,...145
	With no record of sputum examination,.....243							
	{	For three years, 2999,.....	{	Recorded as having had sputum ex- amined....	{	Once, ..1297 More than once, ..146	{	Bacilli present,..946 Bacilli absent,...497
With no record of sputum examination,.....1556								

An earnest effort is made in the Institute to have the sputum of every person who applies for treatment examined often enough to determine whether or not tubercle bacilli exist in the sputum. So far it has not been possible to get a sputum examination of every patient. Gradually our service is improving in this regard, and we look forward to the time when our discipline will be such as to enable us to have a complete record. The chief obstacle in the way of getting sputum examinations is the reluctance of patients to bring sputum. Failure to bring it no doubt often is due to forgetfulness and indifference, but sometimes also to lack of earnest coöperation on the part of the patient.

Presence or absence of tubercle bacilli in the sputum is often misconstrued, not only by the laity, but by members of the medical profession. Too much importance has been given to the presence or absence of the tubercle bacillus, for instance, as a diagnostic or prognostic sign. In reality, it has no value for either purpose other than as a confirmation of other symptoms. The tubercle bacillus in the sputum indicates that lung tissue which has been invaded by the micro-organism has been broken down and is coming away, or perhaps also that tubercle bacilli are escaping from the system through an open ulcer in the lung produced by an advanced tuberculous lesion. The absence of the tubercle bacillus from the sputum, on the other hand, merely means that the

micro-organism does not escape by way of the lungs, and is no indication of its absence from lung tissue or other tissue of the body.

In a way, the presence of the tubercle bacillus in the sputum is a favorable prognostic symptom, inasmuch as it shows that the invading micro-organism is at least beginning to be eliminated from the system; since, once having come into the system, its destruction, encapsulation, or elimination by some process is necessary for recovery. By the same process of reasoning, the absence of tubercle bacilli in the sputum in a case in which there is extensive involvement of the lungs may be a very unfavorable prognostic sign, and in practice this has proven to be the case.

URINARY ABNORMALITIES.

New cases, 655,.....	{	Recorded as having had urine examined,..... 379	{	Sugar,..... 4
				Albumin,.....116
	{	With no record of having had urine examined,... 276	{	Casts,..... 14
				Diazo,..... 48
	{		{	Specific gravity be- low 1018,..... 78
				Specific gravity 1018 or above,.....282
	{		{	No record of specific gravity, ... 19
Summary for three years, 2999,.....	{	Recorded as having had urine examined,.....1035	{	Sugar,..... 17
				Albumin,.....269
	{	With no record of having had urine examined,...1964	{	Casts,..... 51
				Diazo,.....108

No special record on specific gravity in the first two years.

No special record on casts and diazo in the first year. In the summary, therefore, the figures for casts and diazo are from 874 examinations.

With each year our records of examination of urine are improved, but we cannot yet give a report on every case. There are many practical difficulties in the way of getting urinary examinations of dispensary patients. Many patients for one reason or another fail to bring urine for examination.

The difficulties in the examination of urine for tubercle bacilli are too great to permit of routine examination, and we therefore make no report upon the presence or absence of tubercle bacilli in the urine. Nevertheless a study of tubercle bacilli in the urine by members of the staff, a report of which will be made by Dr. Walsh, proves the elimination of tubercle bacilli by the kidneys in the urine.

CONDITION OF THE THROAT.

Number of patients who were recorded as having the throat...	{ Congested,.....257			655	} New cases
	{ Not congested,.....211				
	{ No record,.....187				
	{ Inflamed,..... 53			655	
	{ Not inflamed,.....424				
	{ No record,.....178				
	{ Pale,..... 83			655	
	{ Not pale,.....395				
	{ No record,.....177				
	{ Congested,.....617			1540	} Summary for two years
	{ Not congested,.....568				
	{ No record,.....355				
	{ Inflamed,.....157			1540	
	{ Not inflamed,.....935				
	{ No record,.....448				
{ Pale,.....240			1540		
{ Not pale,.....924					
{ No record,.....376					

No record on first year's cases.

A careful study of the upper air-passages in tuberculous subjects becomes more and more imperative as we get a clearer idea of mixed infection, and of the part which lymphoid tissue and the mucous membranes play as soil for the growth of attenuated micro-organisms. We are merely on the threshold of this line of study.

The terms pale, congested, and inflamed, used in this table, should be looked upon as relative, and not as exact terms. They convey the impressions of a number of men, no two of whom, probably, have exactly the same ideas as to what constitutes paleness, congestion, and inflammation of the mucous membranes. Opinions differ even as to what constitutes normal mucous membranes in an adult. Exactness is not possible until we have better methods of fixing standards in such matters.

CONDITION OF TONSILS.

Tonsils were recorded as having been....	{ Atrophied,..... 20 }		655
	{ Not atrophied,.....292 }		
	{ No record,.....343 }		
Tonsils were recorded as having been....	{ Enlarged,..... 65 }		655
	{ Not enlarged,.....365 }		
	{ No record,.....225 }		

No statistics by clinician until this year.

In this year's report we are giving some statistics on the condition of the tonsils. From studies which have been made at the Phipps Institute, and from work done elsewhere, we believe that the condition of the tonsils should be studied carefully in all cases of tuberculosis, with a view to applying a remedy to diseased tonsils when they exist. The tonsillar tissue frequently becomes tuberculous, and quite often is the seat of activity of other micro-organisms than the tubercle bacillus. We have reason to believe, moreover, that the diseased tonsillar tissue gives an open gateway for the entrance of pathogenic micro-organisms into the system.

The table given here is based upon inspection only, and represents the opinions of a number of men as to the condition of the tonsils in the persons examined. It must not be accepted as an accurate record of the actual conditions as they existed.

DISTURBANCE OF THE ALIMENTARY CANAL.

New cases,.....	{	Who were recorded as having had the tongue.....	{	Coated,.....401	}	Out of 655 cases
				Clean,.....178		
				No record,.....76		
	{	Who were recorded as having had....	{	Dry,.....33	}	Out of 655 cases
				Moist,.....223		
				No record,.....399		
	{	Who were recorded as having had....	{	Appetite,.....303	}	Out of 655 cases
				No appetite,....325		
				No record,.....27		
	{	Who were recorded as having had....	{	Gastric disturb- ance,.....375	}	Out of 655 cases
				Constipation, ...217		
				Diarrhea,.....65		
Summary for two years,.....	{	Who were recorded as having had the tongue.....	{	Coated,.....912	}	Out of 1540 cases
				Clean,.....485		
				No record,.....143		
	{	Who were recorded as having had....	{	Dry,.....81	}	Out of 1540 cases
				Moist,.....520		
				No record,.....939		
	{	Who were recorded as having had, ...	{	Appetite,.....824	}	Out of 1540 cases
				No appetite,....674		
				No record,.....42		
	{	Who were recorded as having had, ...	{	Gastric disturb- ance,.....791	}	Out of 1540 cases
				Constipation, ...512		
				Diarrhea,*.....176		

* There was a record made for three years on patients who had "Diarrhea," the total being 334 out of 2999 cases.

The conditions recorded in this table are those which existed when the patient applied for treatment, and not during the course of treatment. These conditions are necessarily transitory.

The alimentary canal plays an important rôle in tuberculosis and everything appertaining to it is of interest. The most recent investigations seem to prove that it is the usual way of entrance of the tubercle bacillus and that its normality or abnormality has much to do with development of tuberculosis and with recovery from it.

The conditions here recorded are symptoms which are usually accepted as indications of the functional status of the organs concerned with metabolism. Coated tongue, dry tongue, loss of appetite, loose bowels and diarrhea, all are indications that the functional activity and capacity of the alimentary canal are interfered with and may be evidence of organic lesions in some parts of this canal.

Tuberculosis of the alimentary canal, especially of the lower end of the small intestine and the upper end of the large intestine, is a frequent occurrence and tuberculosis of the intra-abdominal organs is by no means rare. Unfortunately we have no well-defined symptom-complex by which these conditions can be determined clinically. Such symptoms as constipation and diarrhea, which one would expect to be indications of tuberculosis of the bowels, may exist when there is no tuberculous involvement of the bowels as well as when there is. In fact, nearly all the symptoms which exist in tuberculosis of the bowels may also exist when there is no tuberculosis of the bowels, and may be entirely absent when there is tuberculosis of the bowels.

THYROID.

Patients recorded as having had.....	$\left\{ \begin{array}{l} \text{Thyroid enlarged, ...} \quad 35 \\ \text{Thyroid not enlarged, ...} \quad 618 \\ \text{No record of thyroid, ...} \quad 2 \end{array} \right\}$	655
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No record in previous reports.

Statistics have been taken during the current year on the con-

dition of the thyroid, with the view of throwing some light upon the relationship between the condition of the thyroid and the circulation. It is believed by some that a symptom-complex, of which an enlarged thyroid is one element, and accelerated pulse-rate and exophthalmos with certain nervous phenomena the other, frequently exists in tuberculosis and marks a group of cases peculiar to themselves. That enlarged thyroid frequently exists in tuberculosis is shown by the table, but what influence it may have upon the disease cannot be determined for the present. Future studies along these lines may lead to definite conclusions.

DISEASES OF THE CIRCULATORY SYSTEM.

New cases, 655..	{	Number of cases with circulatory distur- bance,.....588	{	Aortic stenosis,.....	2
				Mitral stenosis,.....	2
				Mitral regurgitation,.....	24
Summary for two years, 1540 ..	{	Number of cases with circulatory distur- bance,.....1058	{	Mitral stenosis and regurgitation,..	4
				Mitral and aortic regurgitation and aortic stenosis,.....	2
				Mitral and aortic stenosis and re- gurgitation,.....	1
				Dilated right heart,.....	78
				Arteriosclerosis,.....	154
				Accentuated aortic second sound,..	187
				Accentuated pulmonic second sound,.....	343
	{	Number of cases with- out circulatory dis- turbance,.....54	{	Aortic stenosis,.....	10
				Aortic regurgitation,.....	7
				Mitral stenosis,.....	16
				Mitral regurgitation,.....	51
				Mitral stenosis and regurgitation,..	4
				Mitral and aortic regurgitation and aortic stenosis,.....	2
				Mitral and aortic stenosis and re- gurgitation,.....	1
				Dilated right heart,.....	134
				Arteriosclerosis,.....	184
				Accentuated aortic second sound,..	381
Record for first year indefinite and not included.	{	No record,.....13	{	Accentuated pulmonic second sound,.....	664

Record for first year indefinite and not included.

THE HEART.

Accentuation of second sounds,.....	{	Aortic accentuated,.....	187	} 652* cases
		Aortic not accentuated,.....	427	
		No record of aortic,.....	38	
	{	Pulmonic accentuated,.....	343	} 652* cases
		Pulmonic not accentuated,.....	281	
		No record of pulmonic,.....	28	
		Both sounds accentuated.....	115	Out of 652* cases
Reduplication,.....	{	Mitral first,.....	27	} 652* cases
		Pulmonic second,.....	16	
		None,.....	580	
		No record,.....	29	
Organic murmurs,..	{	Presystolic mitral,.....	2	} 652* cases
		Systolic mitral,.....	24	
		Double mitral,.....	4	
		Systolic mitral and double aortic,....	2	
		Double mitral and double aortic,....	1	
		Systolic aortic,.....	2	
		Systolic pulmonic,.....	1	
		None,.....	603	
Functional murmurs,	{	No record,.....	13	} 652* cases
		Systolic at apex,.....	7	
		Systolic at base of heart,.....	3	
		Soft systolic at pulmonic area,.....	6	
		Harsh at pulmonic area,.....	1	
		None,.....	622	
Apex beat,.....	{	No record,.....	13	} 652* cases
		4th interspace inside mid-clavicular line,.....	54	
		4th interspace outside mid-clavicular line,.....	0	
		5th interspace inside mid-clavicular line,.....	528	
		5th interspace outside mid-clavicular line,.....	16	
		5th interspace anterior axillary line,..	6	
		5th interspace mid-axillary line, ...	2	
		6th interspace inside mid-clavicular line,.....	10	
		6th interspace outside mid-clavicular line,.....	10	
		Not recorded,.....	26	
Upper border,.....	{	Third rib,.....	423	} 652* cases
		Fourth rib,.....	170	
		Second rib,.....	29	
		No record,.....	30	
Right border,.....	{	Right border of sternum,.....	155	} 652* cases
		One-half inch beyond right of sternum,.....	78	
		Mid sternum,.....	154	
		Left border of sternum,.....	230	
		No record,.....	35	

* A record is given on 652 cases only. Three cases with displacement of heart to right are reported on separately.

THE HEART.—(Continued.)

Arteriosclerosis, ...	{	Slight,.....	72	} 652* cases	
		Moderate,.....	61		
		Marked,.....	21		
		None,.....	444		
		No record,.....	54		
Cardiac rhythm, ...	{	Normal,.....	608	} 652* cases	
		Irregular,.....	27		
		No record,.....	17		
Thrills,.....	{	At apex,.....	17	} 652* cases	
		Over heart generally,.....	7		
		None,.....	610		
		No record,.....	18		
Pulse,.....	{	Volume,...	Normal,.....	353	} 652* cases
			Small,.....	212	
			Large,.....	70	
			No record,.....	17	
	{	Tension, .	Normal,.....	277	} 652* cases
			High,.....	124	
			Low,.....	239	
			No record,.....	12	

DISPLACEMENT OF HEART.

No. 3158.—Dr. Montgomery.

Accentuated second sound,.....	Impossible to differentiate whether pulmonic or aortic.
Reduplication,.....	No.
Murmurs,.....	{ Functional,..... No. Organic,..... No.
Arteriosclerosis, {	{ Slight,..... Moderate,..... Marked,..... } None.
Apex beat,.....	Not palpable and heard only in- definitely to right of sternum.
Upper border,.....	4th interspace.
Left border,.....	At right border of sternum.
Cardiac rhythm,.....	Regular.
Thrills,.....	None.
Pulse,.....	{ Volume,..... Small. Tension,..... Low.
Cause of displacement,.....	Pneumothorax on left.

No. 3265.—Dr. Landis.

Accentuated second sound,....	{	Aortic,.....	No.
		Pulmonic,.....	Yes.
Reduplication,.....			No.
Murmurs,.....	{	Functional,.....	No.
		Organic,.....	Pericardial friction at apex.

*A record is given on 652 cases only. Three cases with displacement of heart to right are reported on separately.

DISPLACEMENT OF HEART.—(*Continued.*)

Arteriosclerosis,.....	{ Slight,..... Moderate,..... Marked,..... }	None.
Apex beat,.....		4th interspace and right nipple line.
Upper border,.....		3d rib.
Left border,.....		Left border of sternum.
Cardiac rhythm,.....		Good
Thrills,.....		No.
Pulse,.....	{ Volume,..... Tension,..... }	Small. Low.
Cause of displacement,.....		Fibrosis of entire right lung.

No. 3328.—Dr. Ravenel.

Accentuated second sound, {	Aortic,.....	Yes.
	Pulmonic,.....	Yes.
Reduplication,.....		No.
Murmurs,.....	{ Functional,..... Organic,..... }	No. No.
Arteriosclerosis,.....	{ Slight,..... Moderate,..... Marked,..... }	Yes. No. No.
Apex beat,.....		4th interspace on right—midway between sternum and nipple line—not palpable.
Upper border,.....		3d rib.
Left border,.....		Right border of sternum.
Cardiac rhythm,.....		Normal.
Thrills,.....		No.
Pulse,.....	{ Volume,..... Tension,..... }	Good. Moderate.
Cause of displacement,.....		Fibrosis of right lung.

The circulation plays a very important part in tuberculosis. It is generally conceded that implantation of the tubercle bacillus in the parenchymatous tissue of the body takes place through the circulation. We are also beginning to recognize that the circulation has something to do with the elimination of tubercle bacilli from the organism, and that the blood itself is an important factor in the fight against the disease by the organism. The circulatory system therefore in all its parts and functions is of vital importance in the study of tuberculosis.

With a view of giving a more comprehensive picture of this whole subject, we this year give statistics on every phase of the circulatory system which it is possible to take out of the record

made. In tables presented for the first time we can only give statistics for one year; but in the tables presented heretofore we give the summary for three years.

In estimating the value of the statistics given in the tables one should keep in mind that they are taken from records made by a number of men without a definite standard to guide them upon subjects on which it is difficult to be exact. These men, however, all are fairly well trained in physical examination, and the records have been carefully made.

That so large a percentage of persons with pulmonary tuberculosis should have some deviation from the normal in their circulatory systems is not to be wondered at in view of the close relationship between the heart and the lungs. Defects in circulation should be kept prominently in mind in the treatment of tuberculosis.

CONDITION OF THE LIVER.

Patients recorded as having had	{ Liver enlarged,.....	36	} 655
	{ Liver not enlarged,.....	156	
	{ No record of liver,.....	463	
No record until this year.			

In our Second Annual Report we published some interesting statistics on the liver in tuberculosis from the pathological point of view, and in order that the clinical side of the subject may be studied along with the pathological side we are now taking statistics on the condition of the liver as it can be made out at the bedside. Unfortunately the statistics which we are able to offer so far are based upon so few cases that they practically mean very little. The only lesson which this table conveys is the difficulty of getting accurate statistics on the liver from a clinical point of view. It is not easy to accurately outline the liver and it takes considerable training and experience to enable a man to give a judgment which is worth much. This is the explanation of the large number of cases in which no record has been made. In future we hope to be able to give better statistics.

SPLEEN.

Patients recorded as having had	{ Spleen palpable,.....	28	} 655
	{ Spleen not palpable,.....	560	
	{ No record of spleen,.....	67	
No record until this year.			

Our table on the spleen is much more complete than our table on the liver because the question asked is whether or not the spleen can be felt, it being much easier to answer this question than whether the liver is enlarged. The number of cases in which the spleen was palpable is comparatively small, but the number here given seems to correspond fairly well with the relative number of cases which come to the autopsy table with the spleen enlarged.

DISTURBANCES OF THE SYMPATHETIC NERVOUS SYSTEM.

New cases,...	Who were recorded as having had chills at one time or another,.....			323... Out of 655 cases
	Whose temperature when taken,.....	{ Was below 100,...	349	} 655
		{ Was 100 and over, 251		
		{ No record,.....	55	
	Whose pulse when taken,.....	{ Was below 100,...	213	} 655
		{ Was 100 and over, 395		
		{ No record,.....	47	
	Whose respiration when taken,.....	{ Was below 30,...	273	} 655
		{ Was 30 and over, 243		
		{ No record,.....	139	
Who were recorded as having had shortness of breath,.....			539... Out of 655 cases	
Summary for two years,.	Who were recorded as having had chills at one time or another,.....			692... Out of 1540 cases
	Whose temperature when taken,.....	{ Was below 100,...	877	} 1540
		{ Was 100 and over, 570		
		{ No record,.....	93	
	Whose pulse when taken,.....	{ Was below 100,...	640	} 1540
		{ Was 100 and over, 805		
		{ No record,.....	95	
	Whose respiration when taken,.....	{ Was below 30,...	854	} 1540
		{ Was 30 and over, 498		
		{ No record,.....	188	
Who were recorded as having had shortness of breath,.....			1236... Out of 1540 cases	
No record on first year's cases.				

A striking feature of tuberculosis is the disproportion between temperature and pulse disturbance. The pulse is relatively much higher than the temperature. Patients often have quite a high pulse-rate with a normal temperature or a temperature very little above the normal. The reason for this is not fully understood. In very chronic cases the pulse may be normal and the temperature above normal.

The respiratory movement is easily disturbed and thrown out of harmony in tuberculosis. At first thought one would ascribe this to mechanical interference, but it nearly always is disproportionate to the mechanical interference. It is quite probable that both the pulse and respiratory disturbances are due to the action of some toxin on the nerve centers. There is corroborative evidence of this view in the continuance of the pulse and respiratory disturbance during the activity of the disease and its discontinuance when the disease is arrested. It is quite surprising how abruptly a high pulse-rate will return to normal when recovery has taken place.

COMPLICATIONS.

Hernia,.....	2	} Out of 655 cases
Fistula in ano,.....	1	
Movable kidney,.....	1	
Syphilis,.....	3	
Bronchiectasis,.....	1	
Pericarditis,.....	1	
Pleuritic effusion,.....	3	

The complications named in this table are such as may or may not be associated directly with the tuberculous process, but may have some influence upon the progress of the disease by reason of discomfort, interference with functions of the body, or degeneration of the tissues. It cannot be claimed that the statistics are accurate, inasmuch as there are many practical difficulties in the way of determining such conditions in dispensary cases, and the figures here given ought to only stand for the existence of such complications when they easily come to light.

CLUBBED FINGERS AND CURVED NAILS.

Fingers were recorded as having been...	{ Clubbed,.....195 Not clubbed,.....449 No record,.....11 }	655
Nails were recorded as having been.....	{ Curved,.....287 Not curved,.....356 No record,.....12 }	655
No record until this year.		

No record until this year.

The subject of clubbed fingers and curved nails is of scientific interest, and statistics are here gathered with a view of throwing further light upon it. As yet, no one has given a satisfactory explanation of the phenomena. Inasmuch as they occur in some cases and not in others, it is a fair inference that they may be due to the toxin of some other micro-organism than the tubercle bacillus.

It is evident from the tables that the curved nail occurs more frequently than the clubbed finger, although the number of cases here recorded is too small to determine the matter finally. The cause of this condition is under investigation, and it may be that in some future report we will be able to throw some further light upon the subject.

EDEMA.

Number of cases who were recorded as having edema,.....	<table> <tr> <td>New cases,.....</td><td>110, Out of 655 cases</td></tr> <tr> <td>Summary for three years, .</td><td>509, Out of 2999 cases</td></tr> </table>	New cases,.....	110, Out of 655 cases	Summary for three years, .	509, Out of 2999 cases
New cases,.....	110, Out of 655 cases				
Summary for three years, .	509, Out of 2999 cases				

A comparison of the table on edema with the table on urinary abnormalities reveals a close relationship between the presence of albumin in the urine and edema, at least in that part of the table which deals with the past year. The number of cases with albumin during this year nearly corresponds with the number of cases of edema. This relationship does not hold good for the three years, but during the first two years there were relatively fewer examinations of urine made, and the tests for albumin used were less accurate.

Edema in tuberculosis nearly always means fairly advanced

lesions in important organs of the body, and usually indicates the existence of nephritis. When it has set in, even in a minor degree, the prognosis is unfavorable. The treatment usually followed at the Phipps Institute consists of the administration of saline purgatives and heart stimulants.

HEMOPTYSIS. .

Number of patients who had hemoptysis at one time or another,..... { New cases,.....329, Out of 655 cases
Summary for three years, 1459, Out of 2999 cases

About one-half of the patients who have applied for treatment have had hemoptysis at one time or another. The word "hemoptysis" as here used means any form of blood spitting, from blood-streaked sputum to a frank hemorrhage. The subject of hemoptysis has been carefully studied at the Phipps Institute, and a preliminary report of this study will be made in this volume in a separate article.

Whilst a very large number of the patients who have come for treatment at the Institute have had hemoptysis at one time or another, comparatively few of them have had hemoptysis while under treatment; especially is this true of those patients who have been in the Hospital Department. When hemorrhage has occurred in the Hospital Department, it usually has occurred in epidemics, and upon this point our special report will give some interesting data.

For the treatment of hemorrhage the Institute largely depends upon external application of ice, nitroglycerin, and in extreme cases morphia. In all cases the bowels are kept well open with sulphate of magnesia.

NIGHT-SWEATS.

Number of patients who had night-sweats at one time or another,..... { New cases,..... 427, Out of 655 cases
Summary for three years, 1816, Out of 2999 cases

Night-sweats are of frequent occurrence in consumption when the patient is badly fed, badly housed, and overworked, but of

infrequent occurrence when the patient is properly cared for. In the Hospital Department of the Phipps Institute night-sweats rarely occur, although no special treatment is used for them. All that is done is to put the patient to bed in a well ventilated room and to give him easily digested and assimilated food. His bowels are kept well open, usually with sulphate of magnesia, and his skin is kept active with baths and inunctions. Many times night-sweats are brought on by excessive bed-clothing and heated rooms, and when such patients are transferred to properly ventilated rooms and are given the proper amount of bed-clothing, the night-sweats cease without any treatment.

Even in the homes of patients night-sweats usually cease when the diet has been properly regulated and the mode of life and method of sleeping have been correctly arranged. In all cases the excretory organs should be kept active so that the toxin of the micro-organisms infecting the body may be carried out of the system.

HOARSENESS.

Number of patients who had hoarse- ness,.....	{	New cases,.....	{	Persistent,..... 36	}	Out of 655 cases
		Summary for three years,.....		Temporary,..... 329		
				Persistent,..... 335		Out of 2999 cases
				Temporary,..... 741		Out of 1540 cases

During the first year there was a record made on "persistent hoarseness" only.

The table on hoarseness should be studied in connection with the table on the condition of the throat. Temporary hoarseness is nearly always due to an intercurrent affection of the upper air-passages. Persistent hoarseness, on the contrary, is usually due to a tuberculous process in the larynx, though sometimes to a tuberculous process in the tonsils or pharynx. People with a chronic inflammation of the upper air-passages, due to any cause whatsoever, become hoarse very easily, sometimes upon relaxation of the muscular system brought on by fatigue or indigestion.

Patients who have persistent hoarseness or who develop temporary hoarseness very easily can, as a usual thing, be very much benefited by proper treatment of the upper air-passages, and

should have such treatment. Frequently the removal of a diseased tonsil, or even the cleaning out of the crypts of such a tonsil, will give the most wonderful relief.

PAIN.

Number of patients who at one time or another suffered pain,.....	{	New cases,.....	464,	Out of	655 cases
No record on first year's cases.		Summary for two years 1902,		Out of	1540 cases

The subject of pain in tuberculosis is an interesting one and opens up a vast field for study. As yet we can give only statistics, and no deductions.

For the treatment of pain at the Henry Phipps Institute we depend largely upon improvement of the general condition. When the pain is due to pleurisy, we sometimes use fly-blisters and sometimes strap the chest with adhesive plaster. For the pain which is apparently due to a form of toxic neuritis we depend largely upon inunctions with liniment or oil of some kind and sometimes upon fly-blisters. The use of drugs by the mouth for this purpose is rarely resorted to.

FREEDOM FROM COUGH.

New cases,.....	{	Tuberculous,.....	29		Out of	779 cases
		Non-tuberculous,.....	12			
Summary for three years,.....	{	Tuberculous,.....	112		Out of	3886 cases
		Non-tuberculous,.....	61			

For the year, as well as for the three years, a larger number of tuberculous than non-tuberculous patients presented themselves without cough. A study of the table giving the entire number of patients, with the table on "Freedom from Cough," will show that most of the people who came for treatment came because they had a cough. Only sixty-one non-tuberculous, unsuitable, and undiagnosed cases out of the eight hundred and eighty-seven who presented themselves for treatment during the three years, were free from cough; whilst one hundred and twelve tuberculous cases, out of twenty-nine hundred and ninety-nine, were free from

cough. It really is surprising how far a tuberculous lesion of the lungs may advance in some people without setting up enough cough to attract attention. Some allowance must be made for the tendency of patients to put the most favorable aspect possible upon their cases, and the suppression of facts about cough on account of this tendency; and also for incomplete records on account of forgetfulness of patients about cough. Frequently patients say they have no cough when really they have had a short, persistent cough for years. There seems to remain no doubt, however, that tuberculosis of the lungs can exist without cough.

MENSTRUATION AND LEUCORRHOEA.

Women who were recorded as	{	Menstruating, ...	165	} Out of 288 females
		Menstruation stopped		
		by illness, ...	96	
		No record, ...	27	

Women who were recorded as having had Leucorrhœa, ... 142.... Out of 288 females
 No record in previous reports.

The menstrual flow in tuberculosis frequently ceases when the nutrition of the body falls below par. By the laity this event is looked upon with apprehension, because it is believed to be an indication of the early approach of a fatal termination. To some extent this apprehension is well founded, because the condition of the human organism has to be very low before menstruation ceases. Cessation of menstruation is always a conservative measure, however, and except in so far as it indicates a low condition of health need give no distress.

The existence of leucorrhœa in a tuberculous woman no doubt frequently indicates tuberculous involvement of the reproductive organs. Among the laity this symptom has from time immemorial been looked upon as a forerunner of consumption. Whilst this observation is not scientifically correct, it nevertheless is based upon some truth, as has been shown by histological study of the tubes and ovaries in persons who have come to operation for diseases of these organs.

SPECIAL EXAMINATIONS.

Patients who were recorded as having had.	{	Nose and throat examined,.....	331	}	Out of 655 cases
		Nervous examination made,.....	197		
		Skin examination made,.....	6		
		Eye examination made,.....	12		
		X-ray examination made,.....	11		

No record in previous reports.

With a view of getting accurate data upon tuberculosis, and also of giving the very best treatment to patients, all patients who apply for treatment at the Institute requiring any expert services can have such treatment at the hands of a member of the staff. The table here given represents the work of the Institute along these lines during the year.

INSPECTIONS.

655 cases,....	{	Number of patients inspected once,.....	129	{	Total number of inspections,.....	1347	}	Out of 411 cases inspected.
		Number of patients inspected more than once,.....	282		Average number of inspections,.....	3.27		
		No record of inspection,.....	244					

No record in previous reports.

An effort is made by the Institute to keep all dispensary patients under close supervision with a view of carrying out preventive measures in the homes of the patients as accurately as possible. Much difficulty has been experienced in establishing this part of the work of the Institute, but the service is constantly improving. A complete system of inspection will undoubtedly be a most economical measure in the prevention of tuberculosis, and every effort will be made to bring this department of the Institute's work to the highest plane possible.

AID GIVEN.

New cases,...	{	Who received milk,.....	220	}	Out of 655 cases
		Who received preventive-measure supplies,...	479		
Summary for two years,.	{	Who received milk,.....	618	}	Out of 1540 cases
		Who received preventive-measure supplies,...	1040		

No record of first year's cases.

A very essential feature of dispensary work in tuberculosis is the giving of aid to those who are too poor to buy either the necessary food or the necessary preventive-measure supplies. Not only is it impossible to accomplish results in the treatment of the disease and in its prevention without giving assistance, but it is very difficult to even bring the patients to the dispensary and keep them under control for any long period of time without such aid. The ordinary tuberculous subject in the lower walks of life will not bother much about the treatment of his disease so long as he is in fair condition of health, because he is unable to realize that treatment at such times is of importance to him for recovery.

Our table shows that our service is continually improving in the matter of giving preventive-measure supplies, whilst in the matter of giving milk, we are maintaining about the same ratio of persons assisted as from the beginning. The cost of preventive-measure supplies to dispensary patients is not very great, whilst the cost of giving milk is necessarily heavy. With the number of patients to whom milk is supplied at the Phipps Institute, the entire cost of maintenance for milk, preventive-measure supplies, inspection, clerk-hire, housing of equipment, carfares, and medicine at practically the cost of the drugs, averages about eight cents per day per patient.

OBSERVANCE OF RULES.

New cases,.....	{	Number of patients inspected, ... 411	{	Who observed rules well,.....	313	}	411
				Who observed rules fairly well,...	45		
				Who did not observe rules,.....	22		
				Of whose observance of rules no record was made,.....	31		
Summary for two years,....	{	Number of patients inspected, ... 673	{	Who observed rules well,.....	438	}	673
				Who observed rules fairly well,...	141		
				Who did not observe rules,.....	39		
				Of whose observance of rules no record was made,.....	55		

No record of first year's cases.

Owing to the very extensive area which the Institute's work covers, it is practically impossible to gather information upon the observance of rules of all dispensary patients. All the hospital

cases, of course, are under close observation, and are therefore not included in the table bearing upon the observance of rules. Dispensary patients who are visited by inspectresses are all reported on in this regard.

As the table for the two years indicates, most of the patients heartily coöperated with the Institute's endeavors for the prevention of tuberculosis. A few are indifferent, and fewer still are obstreperous and will not live up to rules. The only power which the Institute has for enforcing its rules is that of moral suasion and the withdrawal of assistance if the rules are not lived up to. With most people, intelligent understanding of what is aimed at and earnest advice are all that are necessary.

RETURN PATIENTS.

Number of patients treated this year, 472..	Who had been treated in the hospital the year before,...	35	Improved the year before,...	296	465	Had received assistance the year before,...	388	465
	Who had been treated in the dispensary the year before,...	394	Not improved the year before,...	129		Had not received assistance the year before,...	55	
	Who had been treated in the hospital and dispensary the year before,...	36	Disease arrested the year before,....	7		No record of the year before,...	22	
			No result recorded the year before,....	33				

Only 465 reported on because the diagnosis of the remaining 7 was changed to non-tuberculosis in 1905.

Each year a large number of patients who have been under treatment either during the preceding year or at some time during the Institute's work come back for treatment. Out of the fifteen hundred and thirty-seven poor tuberculosis patients who received treatment during the first two years, four hundred and sixty-five came back for treatment during the third year. Of course, the majority of these were under treatment at the end of

the second year and were simply held over. A certain number, however, had been discharged improved but were obliged to return. On account of poverty they do not remain well, unless assisted. This makes the problem of caring for the consumptive poor a very onerous one. To make a patient well and to keep him well is pretty nearly a life-long burden. The burden is the greater because material aid as well as advice and medication have to be given.

As the function of the Institute is the prevention of tuberculosis as well as the treatment of it, there is necessarily a limit to the time during which material assistance can be given, because a pension list soon springs up if patients are carried too long, which absorbs all the resources of the Institute and prevents the extension of the benefits of the work to new patients. Aid is given to help the patient and to secure an opportunity to instruct him and those about him in the prevention of the disease. When this has been accomplished, further assistance is purely charity and no longer philanthropy. No definite time is fixed for giving aid, but there is an understanding among the staff that patients should not become pensioners.

WEIGHT.

WEIGHT.

New cases,	Number of patients treated,.....		655	{	Weighted,.....	632		
					Not weighed,..	23		
	Number of patients treated in dispensary,.....	Dispensary only	508	{	551	{	Weighted,.....	545
		Dispensary and hospital,.....	43					
	Number of patients treated in hospital,	Hospital only,..	104	{	147	{	Weighted,.....	130
		Hospital and dispensary,..	43					
	Number of patients weighed in dispensary,.....	545	Gained,.....	280	{	Total gain,.....	1881.50 lbs.	
			Lost,.....	145		Average gain,.....	6.72 lbs.	
						Total loss,.....	733.12 lbs.	
			No change recorded,.....	120		Average loss,.....	5.06 lbs.	
Number of patients weighed in hospital,.....	130	Gained,.....	79	{	Total gain,.....	972.25 lbs.		
		Lost,.....	28		Average gain,.....	12.30 lbs.		
					Total loss,.....	200.75 lbs.		
		No change recorded,.....	23		Average loss,.....	7.16 lbs.		

Summary for three years,	Number of patients treated,.....		2999	{ Weighed,.....2780 Not weighed,... 219	
	Number of patients treated in dispensary,.....	Dispensary only	2409	{ Weighed,.....2525 Not weighed,... 115	2640
		Dispensary and hospital,.....	231		
	Number of patients treated in hospital,	Hospital only, ..	359	{ Weighed,..... 486 Not weighed,... 104	590
		Hospital and dispensary, ..	231		
	Number of patients weighed in dispensary, 2525, ...	Gained,.....	1245	Total gain,.....	5385.12 lbs.
		Lost,.....	803	Average gain,.....	4.32 lbs.
		No change recorded,.....	477	Total loss,.....	3205.37 lbs.
				Average loss,.....	3.99 lbs.
	Number of patients weighed in hospital, 486,.....	Gained,.....	215	Total gain,.....	2230.75 lbs.
		Lost,.....	104	Average gain,.....	10.38 lbs.
		No change recorded,.....	167	Total loss,.....	725.12 lbs.
				Average loss,.....	6.97 lbs.

Gain in weight in tuberculosis is at the present time accepted the world over as an indication of improvement and progress toward recovery. Our views in this regard no doubt have been influenced by a contemplation of the one striking symptom of tuberculosis, namely, emaciation. Because great loss of weight accompanies the progress of the disease we have jumped at the conclusion that gain in weight means recovery from the disease. It may be that our conclusions are not altogether warranted by the evidence.

That gain in weight in tuberculosis indicates improvement in health cannot be doubted, but that it indicates recovery from the disease in a strictly technical sense may be questioned. It is possible to make the most advanced tuberculous subject gain weight and take on the appearance of physical well-being, and with this general improvement there undoubtedly is some arrest of the progress of the disease. Unfortunately, however, restoration of physical well-being, as indicated by weight and good appearance, does not always carry with it a germ-free condition of the tissues, and therefore does not indicate a cured state in the true sense of the word.

The weight tables here given show conclusively that advanced

cases of tuberculosis can be made to gain a great deal in weight. The cases admitted into the hospital were practically all advanced and were taken in because they were believed to be dying. It will be seen by the table that the majority of them gained weight and that the average gain was quite large.

RESULTS OF TREATMENT.

New cases,...	Number of cases disease arrested,.....	{ Hospital,..... 1 Dispensary,..... 6 }	7	655
	Number of cases improved	{ Hospital,..... 60 Dispensary,..... 223 }	283	
	Number of cases unimproved,.....	{ Hospital,..... 53 Dispensary,..... 156 }	209	
	Number of cases who made only one visit,.....	Dispensary,..... 81...	81	
	Number of cases terminated in death,.....	{ Hospital,..... 59 Dispensary,..... 16 }	75	
	Number of cases results not recorded,.....	{ Hospital,..... 0 Dispensary,..... 0 }	0	
Old cases,...	Number of cases disease arrested,.....	{ Hospital,..... 3 Dispensary,..... 18 }	21	465
	Number of cases improved,.....	{ Hospital,..... 40 Dispensary,..... 187 }	227	
	Number of cases unimproved,.....	{ Hospital,..... 19 Dispensary,..... 100 }	119	
	Number of cases not recorded,.....	{ Hospital,..... 3 Dispensary,..... 61 }	64	
	Number of cases terminated in death,.....	{ Hospital,..... 22 Dispensary,..... 12 }	34	
	Number of cases disease arrested,.....	{ Hospital,..... 4 Dispensary,..... 27 }	31	
Summary for three years,	Number of cases improved,.....	{ Hospital,..... 217 Dispensary,..... 872 }	1089	2999
	Number of cases unimproved,.....	{ Hospital,..... 211 Dispensary,..... 767 }	978	
	Number of cases terminated in death,.....	{ Hospital,..... 175 Dispensary,..... 129 }	304	
	Number of cases results not recorded,.....	{ Hospital,..... 16 Dispensary,..... 581 }	597	

In 1903 and 1904 no special record was made of patients who paid only one visit.

The results of treatment recorded in this table are those only

which have a direct bearing upon the patient himself and do not include the benefits which have been derived from the preventive side of the treatment. An effort will be made to indicate these in a separate article, showing the reduction in the death-rate from tuberculosis in the city of Philadelphia since the Institute was established and the relationship which the work at the Institute bears to it.

The results of treatment to the individual so far as preservation of life and restoration to a condition of usefulness are concerned are gratifying. In estimating them one should bear in mind that the patients who come to the Phipps Institute are extremely poor and have to cope with the vicissitudes of poverty as well as with the ravages of disease. Nearly 50% of the patients have improved and the mortality has been comparatively low. The mortality statistics here given, however, are not necessarily accurate, inasmuch as it is exceedingly difficult to keep track of patients who no longer come to the dispensary. Probably many of the cases which were put down as "results not recorded" have died and no knowledge of the death has come to the Institute.

LAWRENCE F. FLICK.

EXPECTORATION IN TUBERCULOSIS OF THE LUNGS.

Expectoration is one of the most common symptoms of pulmonary tuberculosis—at least in adults. In seven German sanatoria,* of forty-seven hundred and three patients thirty-nine hundred and six (83.1%) had expectoration, three hundred and seventy-six (8%) had cough without expectoration, and four hundred and twenty-one (8.9%) had neither of these symptoms. In one hundred and forty-four cases in the first stage Roepke found cough present in one hundred and thirty-five (93.8%), expectoration in one hundred and twelve (77.8%), and loss of weight in ninety-two (63.9%). In one hundred and fifty-four patients in the second and third stages, cough, expectoration, and loss of weight were present in all.

In a series of five hundred cases studied at the Phipps Institute with reference to cough and expectoration, only seven gave a history of not having had cough, either on admission or previously; and fifteen of having been without present or previous expectoration. Of course, it is often difficult to obtain exact data about a slight temporary cough or expectoration in tuberculosis.

The figures in the table on page 59 standing by themselves show the comparatively infrequent absence of both cough and expectoration in pulmonary tuberculosis, but it must be borne in mind that the element of activity of the pathological process in all these cases cannot be taken for granted.

The amount of expectoration is variable. According to Sokolowski, it is usually not very abundant, averaging about 15

* Arbeiten aus dem kaiserlichen Gesundheitsamte, Bd. v, 1906.

to 20 c.c. daily. There may be no sputum at all, or the amount may reach as much as 1000 c.c. in twenty-four hours. It commonly varies during the twenty-four hours, and may vary at different periods. In a general way, it is in proportion to the advance of the disease.

		INCIPI- ENT.* 61	MODER- ATELY AD- VANCED. 287	FAR AD- VANCED. 152	TOTAL. 500	PER CENT.
Number of cases, 500,	Without present or previous cough,.....	4	3	..	7	1.4
	With cough not recorded, ...	2	..	..	2	0.4
	With cough absent on admis- sion only,.....	..	2	..	2	0.4
	With cough, but without pres- ent or previous expectora- tion,.....	2	5	..	7	1.4
	Without present or previous expectoration,.....	8	7	..	15	3.0
	With expectoration absent on admission, but present previ- ously,.....	1	6	1	8	1.6
	Without expectoration on ad- mission; previous condition not recorded,.....	1	1	..	2	0.4

Slight expectoration is apt to occur in all forms of pulmonary tuberculosis in the beginning of the disease, due to the amount of associated bronchitis. The amount of expectoration is often small in caseous consolidation without softening, in fibroid tuberculosis, in fatal cases toward the close (due—in part, at least—to weakness), in acute miliary tuberculosis, and in quiescent cavities. Thus, a case may run its course to the fatal ending, and have little or no expectoration. Children expectorate less than adults, both on account of swallowing sputum and on account of being more subject to the “closed” type of pulmonary tuberculosis. Common factors in the production of large amounts of expectoration are marked bronchitis with bronchorrhea, large cavities or

* The stages as used here are those defined by the National Association for the Study and Prevention of Tuberculosis at its First Annual Meeting, and are determined from the records and not directly from the patients themselves.

several small ones, dilated bronchi, and rapid softening of the consolidated areas. Amounts as large as 1000 c.c. are very rarely seen except in secondary conditions, such as bronchiectasis, empyema, and abscess discharging through a bronchus.

		INCIDENT. 61	MODERATELY ADVANCED. 287	FAR ADVANCED. 152
Number of patients, 500,.....	Expectoration absent,.....	10 16.3 %	14 4.9 %	1 0.7 %
	Expectoration slight,*.....	37 60.7 %	126 43.9 %	45 29.6 %
	Expectoration considerable,..	10 16.3 %	86 30.0 %	61 40.1 %
	Expectoration profuse,.....	4 6.6 %	61 21.2 %	45 29.6 %
	Total,.....	61 100 %	287 100 %	152 100 %

The sudden disappearance of sputum when it was abundant before, especially if it occurs in the morning, is apt to be of serious significance. This, at times, happens with the onset of a miliary tuberculosis and of pneumothorax. Lawrason Brown relates an instance in which a sudden attack of heart weakness caused a cessation of expectoration for one or two days, without apparent injury. A sudden increase, likewise,—more particularly, if of a purulent nature,—is often a bad omen. The amount of expectoration can be modified by secondary thoracic affections.

The amount of sputum and the ease with which tubercle bacilli can be found in it are liable to be at variance; a small amount sometimes being so loaded with tubercle bacilli as to make it easy to find them, and a large amount, on account of dilution with mucus and saliva, having them so scattered as to make their discovery very difficult.

* In this table "slight" is used for the terms "little," "slight," "small," " $\frac{1}{2}$ oz.," and "not much"; "considerable," for "over $\frac{1}{2}$ oz.," "less than $\frac{1}{2}$ glass," "free," "moderate," and "fair"; and "profuse," for " $\frac{1}{2}$ glass or over," "much," "a good deal," and "a large amount."

Number of patients whose sputum was examined for tuber- cle bacilli, 323.....	Amount of sputum {	Tubercle bacilli found,.....70 (51.3 %)
	slight, 136,.....	Tubercle bacilli not found,.66 (48.7 %)
	Amount of sputum {	Tubercle bacilli found,.....87 (75.7 %)
	considerable, 115, .	Tubercle bacilli not found,.28 (24.3 %)
	Amount of sputum {	Tubercle bacilli found,.....46 (63.9 %)
	profuse, 72,.....	Tubercle bacilli not found,.26 (36.1 %)

As to the time of appearance of sputum in patients suffering from pulmonary tuberculosis, Fowler and Godlee state that it is rarely absent when symptoms have been present for two months. The question has been raised whether, under normal conditions, both as to the individual and his surroundings, there is expectoration from the lungs. Small amounts of sputum sometimes considered normal, may arise from disease of the mouth, nose, or pharynx, or as the result of some disturbing environmental factor, such as a dusty occupation. Sputum coming even from the upper air-passages can therefore be traced to some pathological condition, or to some factor setting up a functional disturbance in the individual or evoking from him an unusual reaction.

There is no evidence that a patient suffers any injury through loss of nitrogen in the sputum. Renk found the nitrogen in the sputum of fasting individuals to be 6% of the total nitrogen excreted; and 3.8% in the well-fed. Nor, as Ott has pointed out, does the amount of nitrogen in any way indicate how much actual pulmonary disintegration is going on, since we have no way of discovering whether the nitrogen comes from the disintegration of tissue or from mucus and leucocytes present in the sputum.

Of most importance in the sputum of tuberculous patients is the tubercle bacillus. Its absence, even after repeated examinations, warrants no definite conclusions, and in special cases can, at most, be regarded in the light of corroborative evidence for or against a given diagnosis. Perhaps its most useful rôle is in cases in which it receives scant attention; in infants and young children, when other positive evidences may be so hard to elicit. The neglect of this examination is due to the difficulty in obtain-

ing the sputum in such cases, and various methods have been proposed to overcome it, such as: passing a stomach-tube well into the esophagus and staining the mucus adherent thereto; wrapping a piece of gauze on the forefinger and irritating the pharynx with it until the child gags, and then catching the sputum on the gauze before the child can swallow; gastric lavage following the first coughing-spell in the morning; if the child vomits spontaneously, using portions of the sputum in the vomitus; and, finally, recovering swallowed sputum from the feces.

The presence or absence of tubercle bacilli in the sputum is of distinct assistance in the differential diagnosis of empyema, bronchiectasis, pulmonary syphilis, thoracic and abdominal abscesses discharging through a bronchus, malignant disease, and mediastinal tumors. In such cases when the tubercle bacillus is present it is necessary to determine whether the bacillus is playing a primary or secondary rôle.

The frequency of finding tubercle bacilli in sputum varies even for series of patients of the same stage. This variation depends largely upon the care expended in looking for bacilli, and the number of examinations made for the same individual.

Cambridge found bacilli in the sputum of eight hundred and sixty-six patients out of nine hundred and twenty-five (93.6%); and Lawrason Brown, who frequently made more than one examination for the same patient, found them in forty-two out of ninety incipient cases (46.7%); and in eighty out of eighty-seven moderately advanced cases (92%). Turban found tubercle bacilli in three hundred and twenty-five out of four hundred and eight patients (79.9%) during the course of the disease; and, according to stages, in thirty-seven out of ninety-seven cases (38.2%) in the first stage; in one hundred and eighty-four out of two hundred and five cases (89.8%) in the second stage; and one hundred and four out of one hundred and six cases (98.8%) in the third stage. Julius Nagel found tubercle bacilli in one hundred and sixty-one out of ten hundred and eighty-one female

patients; in eleven out of seven hundred and sixty-two cases (1.4%) in the first stage, one hundred out of two hundred and sixty-four cases (38%) in the second stage, and in fifty out of fifty-five cases (90%) in the third stage. Nagel claims that on account of the weaker muscular expiratory mechanism in women the chance of finding tubercle bacilli in the sputum of women is less than it is in men. They are also said to swallow their sputum more than men. From statistics of several different German sanatoriums from records made on admission I find that out of thirty-four hundred and twenty-nine patients with expectoration thirteen hundred and fifty-one (39.4%) showed tubercle bacilli; four hundred and thirty-eight out of fifteen hundred and fifty-five (28.2%) in the first stage; two hundred and twenty-five out of seven hundred and five (31.9%) between the first and second stage; three hundred and two out of six hundred and twelve (49.3%) in the second stage; one hundred and seventy-six out of two hundred and seventy-eight (63.3%) between the second and third stage; two hundred and nine out of two hundred and seventy-six (75.7%) in the third stage; and one out of three in which the stage was not recorded.

C. M. MONTGOMERY.

PULSATING PLEURAL EFFUSIONS.

The great infrequency of pulsations of the chest wall in cases of pleural effusion makes the occurrence of interest. Although the condition has long been recognized, Sailer¹ was able to collect from the literature only ninety-seven cases. This included one case of his own and one case shown by the writer which has not as yet been published and is given in the present series. Sailer's article is very comprehensive and gives a very complete bibliography which has been freely used in the preparation of this paper. According to the pathological condition met with, Sailer was able to recognize five distinct groups: (1) pulsating empyema and pulsating pyopneumothorax with pointing and tumor formation—the so-called “empyema of necessity”; (2) pulsating empyema and pulsating pyopneumothorax without pointing or tumor formation, the chest wall retaining its conformation; (3) pulsating encapsulated empyema; (4) pulsating serous or hemorrhagic effusion; (5) pulsating extra-pleural abscess. The cases recorded in this article belong to Group 2.

From the clinical manifestations Sailer divided the pulsations due to pleural disease into: (1) diffuse pulsations of the thoracic wall; (2) circumscribed pulsations with tumor formation with or without associated diffuse pulsation; (3) true expansile pulsation of the whole thorax, of which only one instance could be found. The cases in the present series all come under the first heading.

The causal conditions given in the cases reported have been rather numerous. Sailer believes that in many instances the cause given was incorrect. Thus tuberculosis is mentioned only eleven times, although without doubt the most frequent cause. The

data in this respect are very deficient. The present series of cases were all tuberculous, as shown by autopsy, sputum examinations, or the results of animal injection.

Case I, Phipps Institute, No. 2660. Age, thirty-three. Female. White. Entered hospital 8—6—'04. She gave a history of illness extending over a period of three years. Cough had existed for one year. On admission she complained of constant dyspnea and of pain over the base of the left lung. Fluid was noted in the left chest 9—6—'04. There was then dulness over the entire left chest. The apex-beat was in the left fifth interspace close to the sternum. On 11—3—'04 it was noted that the heart was displaced to the right, reaching nine centimeters to the right of the mid-sternum in the third interspace. Pulsation was visible and palpable in second, third, and fourth interspaces to the right of the sternum. The left side was enlarged with bulging interspaces. There was a distinct systolic pulsation of the whole left chest, which was most evident to palpation in the second left interspace near the sternum and in the sixth and seventh left interspaces between the mid-clavicular and the anterior axillary lines. Posteriorly the systolic pulsation was visible and palpable over the left base below the scapula. It was most evident to palpation at the lower margin of the ribs in the tenth and eleventh interspaces. The woman's condition was so desperate that she was tapped on 11—9—'04. At the first insertion of the needle the manometer registered plus 25 mm. of mercury, due in all probability to the sudden inspiration and holding of the breath. With return to natural breathing the mercury fell to plus 10 mm., where it remained. No pulsation was transmitted to the mercury. Apparently the pus was too thick in proportion to the calibre of the needle. Fourteen fluidounces of pus were removed. The pulsation disappeared. It reappeared the following day with its maximum intensity at the costal margin. The pulsation was much less violent and there were no subjective symptoms. On 11—14—'04 the pulsation was still present and it was decided to introduce a drainage-tube. This was done by Dr. Carnett on 11—15—'04. Under local anesthesia the skin was incised and a large trocar and cannula thrust into the pleural cavity in the sixth interspace in the posterior axillary line. The trocar was withdrawn and a rubber drainage-tube inserted through the cannula, and the cannula then withdrawn. The rubber tube was stitched to the skin, and after removing about one quart of pus the tube was clamped with a hemostat. The pulsation stopped entirely and did not reappear. Small amounts of fluid were removed daily thereafter. The subsequent course was fairly satisfactory. After a long convalescence she began to improve, and is now

doing fairly well. The lung did not expand and she has an artificial pneumothorax.

Case II, Philadelphia General Hospital, No. A 9714. Age, thirty-eight. Male, negro. Admitted to the Philadelphia Hospital 12-14-'05 with the history of a sudden onset of a pneumothorax four days previously. He complained of cough, marked dyspnea, and a feeling of oppression over the chest, but no actual pain. He was unable to lie down in bed. The position of greatest comfort was a sitting one, leaning slightly toward the right side. The right side of the chest was larger, the interspaces were obliterated, and the motion was distinctly less than on the left side. There was hyperresonance over the right chest anteriorly from the apex to the costal margin and to the left as far as the left border of the sternum. Posteriorly there was dull tympany down to the spine of the scapula and dulness over the scapula. Below the scapula the note was full and resonant. Over the anterior surface of the right chest there was a systolic pulsation from the fourth interspace downward to two fingers below the costal margin. There was no pulsation posteriorly. The liver was displaced downward. The heart was displaced to the left so that the apex was in the left fifth interspace in the anterior axillary line. Over the right side there was distinct bell tympany and an exquisite succussion splash. Pulsation of the liver was ruled out because of the lack of evidence of any heart insufficiency and the location of the pulsation. The left chest anteriorly and posteriorly showed normal signs except for numerous asthmatic râles. The abdomen was distended and showed tympany reaching upward to the fifth rib on the left side. The patient died before the intrapleural pressure could be estimated. The chest was tapped after death just before autopsy and a positive pressure of 15 mm. of mercury was found on the right and a negative pressure of 3 mm. of mercury was found on the left. This is the highest positive intrapleural pressure that I have met with in the cases of pneumothorax that I have tapped. The autopsy by Dr. Cattell confirmed the diagnosis. The lung was found to be adherent to the diaphragm, to the pericardium, and at the apex, thus forming a flattened layer of dense tissue in direct contact with the pericardium. The heart was apparently normal, the liver not enlarged, there were no dilated veins indicative of cardiac insufficiency.

Case III, private case. Age, twenty-six. Female. White. Came under observation at a private sanatorium 10-13-'06. She gave a history of illness since the birth of a child in April of the same year. She had had considerable cough and expectoration and had been able to lie down only on the right side for two months. She arrived at the sanatorium on the afternoon of 10-12-'06,

and during the night was suddenly seized with pain on the left side which persisted. She was first examined on the afternoon of 10-13-'06. At this time she was able to lie only on the right side, had a temperature of 103°, a pulse-rate of 150, and respirations of 38. The heart was displaced to the right. The left chest was larger than the right; the interspaces were more full, and the motion was diminished. Tactile fremitus was diminished on the left, and percussion yielded a full hyperresonant note down to the costal margin. There was no metallic tinkling, no coin test, no Hippocratic succussion splash. The right lung was normal except for some prolongation of expiration over the apex. A diagnosis of left-sided pneumothorax was made. The coin test appeared in about ten days. Fluid was detected about the third week. The succussion splash came on about the fourth week. The patient, after recovering from the shock of the onset of the pneumothorax, began to improve. There was gain in weight and diminution in pulse and temperature. The fluid in the chest increased very gradually. The pneumothorax was left undisturbed, since from the history of the rapid progress of the tuberculous infection and the improvement after the onset of the pneumothorax, it seemed possible that the compression of the lung and its complete quiet had acted favorably upon the tuberculosis, which was apparently entirely left-sided. The right lung was nearly normal. On 1-19-'07 she began to complain of a very slight shortness of breath when at rest. On 2-2-'07 the pulsation was first noted. She said that she had a sensation at times as though the heart was beating on the left side. The examination made on 2-2-'07 showed dulness on this side up to the fourth rib anteriorly and to the angle of the scapula posteriorly. Grocco's triangle was very distinct on the right side when sitting or standing. (This is a triangular area of dulness found along the vertebral column upon the unaffected side in cases of pleural effusion. The triangle is approximately a right-angled one. The vertical side corresponds to the spinal column and extends upward to the level of pleural dulness. The base extends horizontally outward along the line of the lower margin of the sound lung. The hypotenuse connects the two lines. The size of this triangle will depend upon the extent of the pleural effusion.) Strangely enough the pulsation was most distinct when lying on the right side, at a point in the posterior axillary line in the seventh and eighth interspaces. This portion was distinctly hyperresonant, apparently giving evidence that the pulsation is transmitted as well through air as through liquid. In this position Grocco's triangle disappeared. The heart was still on the right side with very evident pulsation in the third, fourth, and fifth right interspaces, one and one-half inches to the right of the sternal margin. With the ear over the pulsation it was apparently synchronous with the systole of the heart. The patient was sent to St. Agnes' Hospital and Dr. Carnett

introduced a rubber drainage-tube in the manner already described in Case I. The intrapleural pressure in this patient varied between plus 5 and plus 6 mm. of mercury. The variation corresponded with the breathing. The fluid was removed in small quantities each day. The tracing shown opposite page 64 was taken just before the introduction of the drainage-tube.

Case IV, Hospital of the University of Pennsylvania. No. 1957. Age, twenty-three. Male. White. Admitted to hospital 12-1-'03. The illness began one year previously with a heavy cold. The symptoms noted at that time were cough and general weakness, which compelled the patient to give up work at intervals until 9-1-'03, when he ceased trying to work. During the summer of 1903 he had a slight pain in his chest at times, and he noted gradually increasing dyspnea. The cough persisted, and while, as a rule, the expectoration was moderate, he would on occasions expectorate large amounts. During this period he had several attacks of blood-spitting. His chief complaints on admission were cough, weakness, loss of weight, pain in the left side, and at times dyspnea. The urine was normal; the blood examination showed 10,200 white cells; the sputum was negative; the physical examination showed no cyanosis, no edema, no venous engorgement; he had some dyspnea. The left chest was enlarged and showed diminished motion. There was a tympanitic note on the left, extending to the fourth rib, where absolute dulness began. Posteriorly absolute dulness began at the third spine and extended downward; this dulness was freely movable. There were no breath-sounds. On the right side the percussion note was good, the breath-sounds were somewhat harsh. There were present on the left metallic tinkling, bell tympany, and succussion splash. The heart was displaced to the right. The apex-beat was felt in the fifth interspace, three-quarters of an inch inside the right nipple line. Pulsation was visible in the third, fourth, and fifth right interspaces. The second sound was accentuated. There were no murmurs or irregularities. The liver and spleen were apparently normal. The patient was discharged 12-16-'03 and re-admitted 2-24-'04. On re-admission he complained of moderate dyspnea which increased very greatly on the slightest exertion, and also on lying on the right side. The urine at this time showed a trace of albumin, but no casts. He remained in the hospital without much improvement until 4-5-'04, when he was tapped in the mid-axillary line in the sixth left interspace, and forty-two ounces of thick, grayish fluid removed. Following this the heart moved more to the left. On 4-24-'04 he was discharged much improved. Within a short time he was seen in the dispensary, when there was noted over the left chest in the axillary region, most marked about the fifth and sixth interspaces, a pulsation which was synchronous with

the heart-beat. The left side was everywhere flat. There was no longer any hyperresonance or movable dullness. The heart could still be felt to the right of the sternum. This patient passed from observation and remained comparatively comfortable for two years, when he died of progressive tuberculosis.

The cause and mechanism of the pulsation in cases of pleural effusions have been subjects of discussion for a long time. Sailer (*loc. cit.*) made an attempt to review the various theories and to arrive at a definite conclusion. His final conclusion was that "the mechanism depends in all probability upon a positive pressure in the pleural cavity with tension of the mediastinum."

To appreciate the mechanism of the production of this pulsation we must first consider the anatomical factors concerned. Pulsation can only be produced within the chest by the heart or arteries, and the only artery of sufficient size coming in connection with a pleural effusion is the descending aorta. Hence with a normal circulatory apparatus the heart and the descending aorta are the pulsating bodies to be considered. The transmission of pulsation can readily be accomplished by fluid or air. Hence any form of pleural effusion can transmit pulsation if the proper circumstances are present. Under normal conditions without effusion the pulsations from the heart and the aorta are absorbed by the lungs, which are in a condition of tension because of the negative intrapleural pressure and readily retract with any slight increase in size of the pulsating organs. In pleural effusions the intrapleural pressure becomes changed, first from minus to zero and then to positive. Following this, the lung first retracts because of its elasticity and then becomes compressed. The degree of compression depends upon the amount of effusion. With diminishing size of the lung there is less chance for the intrathoracic pulsations to be accommodated and the pulse-waves begin to reach the chest wall. How soon they will be recognized will depend upon the size of the waves and the thickness of the chest wall, as it is evident that the thicker the wall, the stronger the waves must be in order to be perceptible.

Before considering the factors which influence the size of the pulsation waves, let us consider the pulsating bodies and their behavior under increased intrapleural pressure. Under the usual conditions the heart swings to either side with comparative ease, thus keeping constantly in contact with the resilient lung, which offers less resistance than the pleural effusion (or the heart would not be displaced) and consequently absorbs its pulsations. In other words, the pulsations naturally follow the line of least resistance. With the descending aorta the problem is a different one. As pointed out by W. J. Calvert,² the descending aorta is firmly anchored by the intercostal arteries and lies on the left side of the vertebræ in contact with the parietal pleura from the sixth dorsal vertebra as far down as the diaphragm. We have thus in left-sided pleural effusions a pulsating body in direct contact with the effusion which cannot be pushed aside. Moreover, this pulsating body is so situated that the effusion bears upon it, not only because of the pressure, which is equal throughout the pleural space, but because of the actual weight of the effusion, which is here thickest. Most convincing of this is the illustration of the artificial left-sided pleural effusion reproduced in Thayer and Fabyan's article in the January issue of the "American Journal of the Medical Sciences." It is this anatomical condition which makes pleural pulsation more common upon the left side.

The accompanying cut (Fig. 1) of a tracing made from Case III shows distinct arterial characteristics. Unfortunately it was impossible to get a simultaneous tracing from the apex.

Very recently Calvert³ has tried to show that a pulsation transmitted from the heart through an empyema must be diastolic in time. His experiment is ingenious. "A cannula connected with a mercury manometer was inserted in the right carotid artery (of a dog under ether). A cannula connected with a mercury manometer and a large bottle of normal salt solution was inserted in the pericardium. From the bottle, salt solution was allowed to flow into the pericardium under varying pressures and the intra-

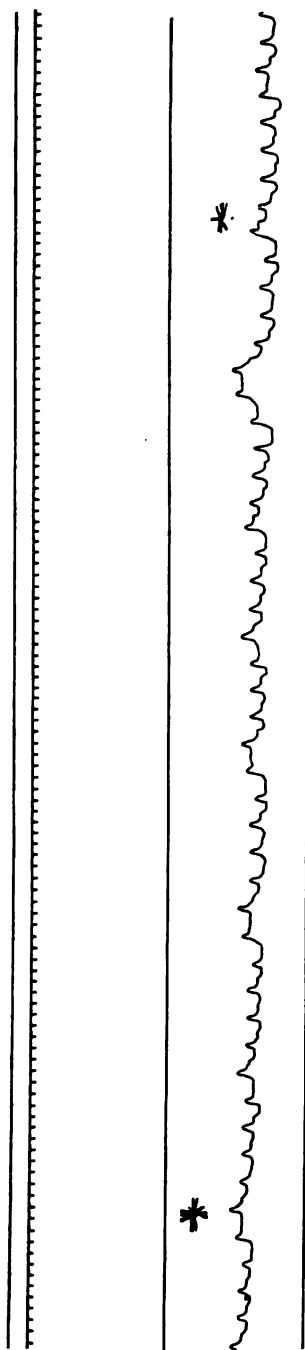


FIG. 1.—(Case No. III.) Tracing taken from a case of left-sided pulsating pyopneumothorax with the patient lying on the right side. The receiver was placed over the eighth left interspace in the posterior axillary line. Air transmission. The asterisks show the well-marked secondary wave.

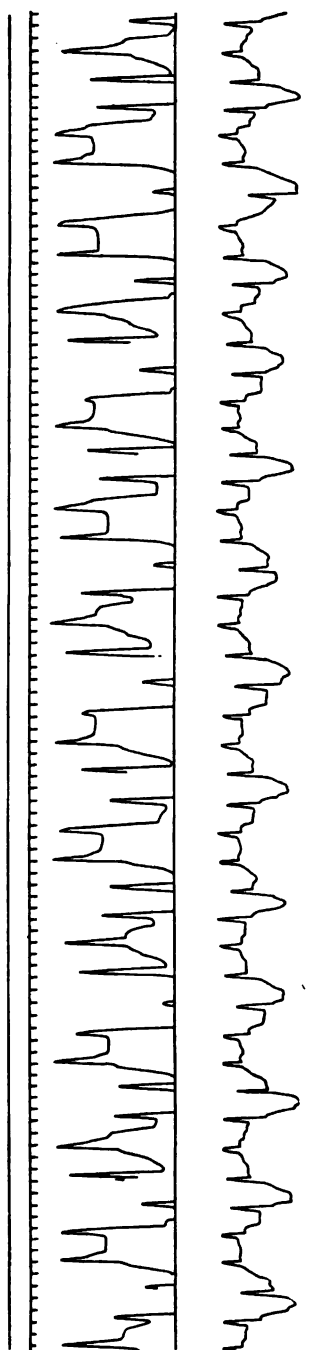


FIG. 2.—Tracing from a case of advanced tuberculosis with excessive shrinking of the left side so that a distinct pulsation was apparent posteriorly between the spine and the angle of the scapula. The upper tracing is from the fifth left interspace anteriorly just outside the mid-clavicular line. The lower tracing is from pulsating point posteriorly. Note that the up stroke in the lower tracing occurs just before the up stroke in the upper tracing.

pericardial pressures and the pericardial pulsations were recorded along with the pulse.

"This experiment demonstrated that, when the pericardium is distended with fluid, there is a pericardial pulsation with each heart cycle. The tracings show that as the pulse curve rises the pericardial curve falls. When the pulse curve is highest the pericardial curve is lowest, and as the pulse curve falls the pericardial curve rises. The pulsation of the pericardium, which is diastolic in time, is caused by the diminution in the size of the heart during systole and directly to the blood leaving the heart. As a portion of the blood leaving the left ventricle passes out of the thorax to the head and the arms, the amount of blood passing through the thoracic aorta is less than the contents of the left ventricle. (The blood in the right ventricle remaining within the thorax may be disregarded.) The end result is that the thoracic contents are diminished in systole by the heart's contraction and increased by the distention of the aorta. The distention of the aorta in systole cannot compensate for the diminution in the size of the heart, because a portion of the blood passes immediately out of the thorax to the head and arms and out of the thoracic into the abdominal aorta. (The amount of blood flowing into the thorax through the large veins in this short interval of time is of very little practical importance in this consideration.)

"The thoracic cavity becomes smaller during systole by the amount of blood which leaves the cavity. If under normal conditions a pulsation occurs, it should be diastolic in time, as is true of the pericardium, and for the same reasons.

"As a direct factor in causing the pulsation (in pleural effusions) the heart may be excluded or else the pulsation must be diastolic in time. The sudden flow of blood into the aorta causes the vessel to suddenly become larger or to pulsate."

Although the explanation offered by Calvert is most plausible, and is apparently borne out by the tracing shown, the matter cannot be considered fully explained. From his experiment, as well as

from a consideration of the facts, it is evident that a heart, compressed as is the case in a pleural effusion and with the intrapleural pressure so markedly increased, would hardly be able to dilate with sufficient force to cause a pulsation unless there were complicating pericardial adhesions. Yet in the three cases of MacDonnell⁴ the pulsation is recorded as diastolic in each instance. All of these were left-sided.

It has been impossible to review the entire literature, but a sufficient number of case histories have been gone over to make it clear that the timing of the pulsation is a matter of great difficulty. The terms used are very loose. Thus Vidal⁶ states that in his case (a small tumor on the right side at the base of the sternum) the tumor pulsated synchronously with the *heart* and the *pulse*. Ardn⁶ mentions the pulsation as synchronous with the pulse. When the condition has reached the stage of pulsation the patient is usually greatly reduced and the pulse so rapid that the differentiation of the time is extremely difficult. To illustrate this a tracing is shown (Fig. 2) from a patient with advanced disease of the left lung with retraction. Besides the ordinary pulsation over the heart anteriorly there was a distinct pulsation, apparently systolic in time, to the inner side of the angle of the scapula posteriorly. This was thought to be a displaced and rotated apex-beat. The tracing, however, shows that the impulse posteriorly occurs a very short time before the one anteriorly and is probably due to the auricle. Both tracings are by air transmission with tubes of equal length. Still other factors must be considered in the production of the pulsations. These are the factors influencing the size of the pulsations and their transmission to and through the chest wall to the palpating hand.

The principle here involved is exactly the same as that employed in the determination of the low or diastolic pressure in the brachial artery in the ordinary blood pressure estimation. As we increase the pressure in the armlet and the mercury column rises, pulsations appear which gradually increase in size until they reach a

maximum and then diminish until they finally disappear. The maximum pulsation is produced when the pressure outside the artery is equal to the diastolic pressure within the artery. The same thing can be readily demonstrated by feeling the radial pulse. With light pressure it feels feeble and small; with increasing pressure it grows larger and stronger and then diminishes in size. Hence, the lower the blood pressure, and the thinner the chest wall, the less the pressure necessary to produce a pulsation. Because of its weight a fluid effusion will produce pulsation with a lower intrapleural pressure than a gaseous effusion. Since a thin and relaxed chest permits perception of pulsation more readily, loss of weight, weakness, and duration of disease are factors. A final factor in the size of the pulsation is the rapidity of the heart in relation to the density and liveliness of the transmitting media. The more rapid the heart, the smaller the pulsations, and with dense effusions the rapid pulsations are not well transmitted owing to the inertia of the fluid.

On the right the chances of pulsation are much less and depend upon some abnormality in the fixation of the heart. Case III, here reported, is the only right-sided case I can find on which an autopsy was done. The excessive intrapleural pressure and the condition found postmortem explain this fully.

None of the cases here reported showed tumor formation. It seems very likely that such cases will be infrequent, as our present means of diagnosis and methods of treatment ought to prevent a case remaining unoperated for so long a period.

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W. B. STANTON.

ALBUMINURIA IN PULMONARY TUBERCULOSIS.

Regarding the passage of substances from the kidneys the general view is that the water of the urine comes chiefly from the glomeruli and the solid constituents chiefly from the tubules. According to one theory, this results from a secretory action of the renal epithelium (Bowman, Heidenhain¹); according to another, from a simple process of filtration or diffusion. Probably filtration, or, more accurately, transudation, and secretion both occur, the former being more especially confined to the glomeruli and the latter to the epithelium of the tubules. Senator² believes with Ludwig that albuminuria is the result of a transudation of albumin from the blood-plasma, not a secretion from the cells, though the cells may limit its output. He draws especial attention to the albuminuria of new-born infants, which he ascribes to the desquamation of the epithelium of the growing glomeruli, permitting the escape of albumin.

Among other facts suggesting the occurrence of transudation rather than of secretion in the escape of albumin from the kidneys, are, first, the appearance in the urine, both in health and disease, of some form of albumin native to the blood, such as serum-albumin, which would hardly remain unchanged after being subjected to such a process as secretion; and, second, the occurrence of albumin of eggs and of beef-juice in unaltered form in the urine after ingestion of these substances.¹⁵ Again, the elimination in the urine from apparently normal kidneys of actual particles like bacteria must be explained in some other way than by a metabolic process like secretion. After the epithelial cells of the kidneys

have become diseased, however, substances such as albumin can more readily escape into the urine in some purely mechanical way, like filtration.

Serum-albumin has been found by delicate tests to be present in normal urine in the proportion of 0.0022% to 0.0078% (Mörner³). The term albuminuria, however, as commonly used, signifies an amount of serum-albumin in the urine sufficient to be recognized by reliable clinical methods such as are ordinarily employed. It is seen in both normal and pathological conditions. Normally, albuminuria occurs in a certain number of new-born infants.⁴ It is found frequently in normal pregnant and parturient women, according to some observers in as many as 46% to 80% of cases.⁵ Finally, it is probably present in some of the cases of so-called physiological albuminuria, seen especially in children and young adults.⁶ Pathological albuminuria coming from the kidneys appears in many conditions and may be classified, broadly speaking, under two main headings: first, general or systemic; and, secondly, local or renal albuminuria. The conditions producing it do not occur independently of each other in most cases of albuminuria, though one, either local or systemic, may predominate.

Albuminuria, both normal and pathological, at times occurs without any demonstrable alteration of the kidneys. An interesting case of this kind has recently been reported by Heubner⁷ in a child with orthostatic albuminuria of a year and a half's duration, the kidneys at autopsy showing no change except such as might be attributed to the long death agony in the case. As methods of diagnosis and of microscopic technique have advanced, there has been a relative decrease in those cases of albuminuria not exhibiting some abnormal condition of the general system, or an alteration of some of the renal structures, such as the epithelial cells or the blood-vessels. Future improvements in diagnosis and microscopy will, doubtless, reduce the proportion of these cases still further.

Albuminuria in small amounts is a common symptom in

tuberculosis, and may be considered as one of the regular manifestations of the disease at some period in its course. Its occurrence in these small amounts presents nothing distinctive by which clinical information of value may be obtained. In fact, the examination for albumin alone may lead one astray, since quite marked nephritis may exist without there being much albumin in the urine. The ordinary microscopic appearance of the kidneys in patients dying of tuberculosis is that of a severer grade of nephritis than the usual small amounts of albumin present ante mortem would indicate to one who had no other information regarding the patient than the amount of albumin in the urine. In large amounts and in association with other urinary findings, it has about the same clinical value in tuberculosis as in other diseases. Solly⁷ considers that the albuminuria in tuberculosis may be an indication that the alimentation is being pushed too far, often in the matter of meats, and even more in that of eggs. At times, however, it does give distinctly valuable information, and, in conjunction with other urinary abnormalities, should be examined for in all cases of tuberculosis, and in many of them repeatedly.

Albuminuria as a symptom of early tuberculosis or as a suggestive incident in young persons with a family history of tuberculosis has received considerable attention from Teissier⁸ and others. Teissier attributed it to a congestive action of the tuberculous virus on the renal structures during an early or premonitory stage of the disease. Tuberculous toxins are known to pass through the kidneys and to be capable of injuring them. Kobler and Lenoir¹⁰ have shown that during a tuberculin reaction albumose appears in the urine in larger quantity than is represented by the material injected. Cornet¹¹ states that tuberculin injected intravenously into animals has produced distinct nephritis. Bouchard and Maragliano¹² have demonstrated the occurrence in the urine of consumptives of certain substances toxic to dogs, and such substances have been shown to be non-poisonous after the animals have

received injections of antitoxic serum. While, however, the albuminuria of early tuberculosis may be due to the toxins of the disease, in doubtful cases we have no way of distinguishing it from other varieties occurring without demonstrable cause. I refer especially to a class of cases in which the albuminuria is often transitory and variable in amount, frequently but not necessarily confined to young people, often associated with some determinable cause, such as special forms of diet, intense physical strain, cold baths, psychical excitement, etc., but without any demonstrable pathological condition, either systemic or renal; a class of cases close to the border-line between health and disease and commonly described by the terms physiological, transitory, and intermittent albuminuria. Conditions similar to those underlying physiological albuminuria, whether they are due to an abnormal state of the vascular apparatus, or to some other condition, are probably at times fostered by the tuberculous process. Roepke²⁰ gives some interesting data from two sanatoria for early cases of tuberculosis, one presenting seventy-two patients with a trace of albumin in the urine out of one hundred and seventy-one; the other presenting no case in one hundred patients. He attributes this to a larger meat diet in the first sanatorium and a lack of certain therapeutic advantages which are possessed by the second. Albuminuria alternating with phosphaturia has likewise been considered a point of value in some cases of early tuberculosis.

Albumin in tuberculosis may come from some part of the genito-urinary tract below the kidneys, such as the seminal vesicles or prostate gland. Fenwick²¹ has drawn attention to what he terms "serum-leakage," in which some form of obstruction, such as enlarged prostate, stone, or stricture, has set up a chronic inflammation in the bladder with desquamation of the epithelium, which, along with the associated straining, allows the escape through the bladder walls of a variable amount of serum.

In examining for serum-albumin some method should be employed to exclude a reaction for nucleo-albumin, which is quite

often present. A satisfactory one consists in adding one-fifth volume of a saturated sodium chloride solution to the urine, followed by heat and acetic or nitric acid, the reaction not being considered negative until the urine has stood for several minutes.²² Clear urine and clean test-tubes, a proper disposition of the light, and experience, will often reveal faint traces otherwise overlooked.²³

According to different statistics, albumin is found in pulmonary tuberculosis in anywhere from a small percentage up to 100% of cases, as may be seen from the following table:

Walsh ¹⁴	in	100 patients	47 had albumin	(47 %)
Gauche ¹⁴	"	46 "	9 "	(19.6 %)
Le Noir ¹⁴	"	715 "	218 "	(30 %)
Lacombe ¹⁴	"	100 "	6 "	(6 %)
Andiganne ¹⁴	"	100 "	50 "	(50 %)
Landis ²⁰	in	26 cases of acute miliary tuberculosis,		
		19 had albumin	(73.1 %)	
Emerson ⁶	number of patients	not stated, all had		
		albumin	(100 %)	
Phipps Institute, first three years.	in	1035 patients	269 had albumin	(26 %)
Phipps Institute, third year.....	"	379 "	116 "	(30.6 %)

The figures at the Phipps Institute refer only to those patients whose urine was examined, among whom there was a large proportion of ward patients; the tests were made by Mr. Karl W. Smith, Laboratory Assistant, with heat and acetic acid.

Albuminuria may be present at any period in pulmonary tuberculosis, but its frequency increases as the disease progresses. It is of common occurrence in advanced cases, and toward the end of life it is rarely absent.

Guihal¹⁴ says that albuminuria in tuberculosis may be temporary or intermittent, and that it is more frequent in the evening than the morning urine.

Amount.—One of the characteristics of the albumin in pulmonary tuberculosis, according to observations in a large number of cases made at the Phipps Institute, is its small amount. Usually only a trace is present, and this may be very faint. In advanced cases there is generally a slightly larger amount, but it is uncommon

at any stage to be able to estimate the amount with Esbach's albuminometer. At times a rather sudden increase takes place toward the end of life. The supervention of any of the forms of nephritis ordinarily accompanied by much albumin in the urine may cause a marked albuminuria. Large amounts of albumin are usually of serious import, but even after lasting many months the albumin may disappear entirely with an improvement in the pulmonary condition.¹⁶ Solly¹⁷ mentions a case still alive after having had albuminuria for twenty years.

AGE.			
Number of cases treated, 655....	Urine examined, 379,...	Under 10 years, . 6	With albuminuria, . 3 (50 %)
			Without albuminuria, ... 3 (50 %)
		10 to 20 years, . 59	With albuminuria, . 16 (27.1 %)
			Without albuminuria, ... 43 (72.9 %)
		20 to 30 years, . 123	With albuminuria, . 34 (27.6 %)
			Without albuminuria, ... 89 (72.4 %)
		30 to 40 years, . 106	With albuminuria, . 37 (34.9 %)
			Without albuminuria, ... 69 (65.1 %)
		40 to 50 years, . 61	With albuminuria, . 15 (24.6 %)
			Without albuminuria, ... 46 (75.4 %)
	Not examined, 276.	Over 50 years, . 24	With albuminuria, . 11 (45.8 %)
			Without albuminuria, ... 13 (54.2 %)

These figures indicate that albuminuria in tuberculosis occurs most frequently under ten years of age (in 50% of cases). It is found nearly as often over fifty (in 45.8% of cases); then follow in the order given the decades thirty to forty (34.9%), twenty to thirty (27.6%), ten to twenty (27.1%), and, lastly, forty to fifty (24.6%). Guihal, on the other hand, states that albuminuria in tuberculosis is commoner in young adults and less frequent between the ages of thirty and forty. Our data are obtained largely from moderately and far advanced cases. In chronic nephritis from all causes the parenchymatous variety is more common in young adults, while the interstitial is seen oftener between forty

and sixty. In tuberculosis, however, the parenchymatous variety is more common at all ages.

		SEX.	
Number of cases treated, 655,...	Urine examined, 379,...	Males, ...213	{ With albuminuria,.. 69 (32.4 %) Without albuminuria,.....144 (67.6 %)
		Females, ...166	{ With albuminuria,.. 47 (28.3 %) Without albuminuria,.....119 (71.7 %)
	Not examined, 276.		

There are about 4% more males than females with albuminuria. Chronic nephritis, especially the interstitial form, is found more often in the male than in the female sex.

PREVIOUS DISEASES.

Number of cases treated, 655,...	Urine examined, 379,...	Scarlet fever, .65	With albuminuria,..	24 (36.9 %)
			Without albuminuria,.....	41 (63.1 %)
		Typhoid,.....64	With albuminuria,..	23 (35.9 %)
			Without albuminuria,.....	41 (64.1 %)
		Pleurisy, ...90	With albuminuria,..	30 (33.3 %)
			Without albuminuria, ...	60 (66.7 %)
		Pertussis,....140	With albuminuria,..	44 (31.4 %)
			Without albuminuria,.....	96 (68.6 %)
		Pneumonia, ..59	With albuminuria,..	18 (30.5 %)
			Without albuminuria,.....	41 (69.5 %)
Measles,.....229	With albuminuria,..	55 (24 %)		
	Without albuminuria,.....	174 (76 %)		
Not examined, 276.				

It is not safe to draw deductions from this table because a number of the diseases may have occurred in the same individual. Scarlet fever gives the largest proportion of cases with albuminuria, and measles the smallest number.

These are only some of the diseases from which patients of the type coming to the Phipps Institute suffer, but they give some idea of the strain on the kidneys from acute infections. Acute diseases are commoner among the poor than among the well-to-do. Among

these diseases may be especially mentioned the acute gastro-intestinal diseases of infancy, which a number of observers in Germany, and Jacobi in this country, have shown to be frequently accompanied by nephritis. Though the damage to the kidneys may not be very evident, there is probably often left behind what Senator terms a predisposition to future affections of the kidneys.

EDEMA.

Number of cases treated, 655,...	Urine examined, 379,...	Edema present, 62	With albuminuria, ... 22 (35.5 %)
			Without albuminuria, ... 40 (64.5 %)
	Not examined, 276.	Edema absent, 317	With albuminuria, ... 94 (29.6 %)
			Without albuminuria, ... 223 (70.4 %)

Or to put it another way:

Number of cases treated, 655,...	Urine examined, 379,...	With albuminuria, ... 116	Edema present, ... 22 (19 %)
			" absent, ... 94 (81 %)
	Not examined, 276	Without albuminuria, ... 263	Edema present, ... 40 (15.2 %)
			" absent, ... 223 (84.8 %)

Edema occurred somewhat more frequently in the cases with albuminuria than in those without albuminuria. In the one hundred and sixteen cases of albuminuria there were twenty-two with edema (19%); while in the two hundred and sixty-three cases of non-albuminuria there were only forty with edema (15.2%). In three thousand and nine cases of tuberculosis treated at the Phipps Institute in three years, five hundred and nine had edema (16.7%).

The amount of edema in tuberculosis is rarely marked; usually it is slight in amount and might be described by the term "hydrops cachecticus," a fairly common occurrence late in the course of certain prolonged diseases.

In twenty-two cases of albuminuria that came to autopsy five showed edema; in three of these the heart was considerably involved.

As to the association of edema and nephritis, Senator²⁷ has drawn attention to the fact that dropsy is more liable to be observed in some forms of acute nephritis than in others. He mentions particularly the nephritis of scarlet fever and of pregnancy; also that produced by cold and malaria. A typical occurrence in these cases he finds to be an early involvement of the vascular tufts of the glomeruli, a glomerulo-nephritis. Among the forms of acute and toxic nephritis in which dropsy is not a marked symptom or occurs late, he states that the epithelium of the tubules is first attacked.

DURATION OF DISEASE BEFORE ADMISSION.

Number of cases treated, 655,...	Urine examined, 379,...	Under 2 years, .158	With albuminuria,...	41 (25.9%)
			Without albuminuria,.....	117 (74.1%)
		2 to 5 years, .131	With albuminuria,...	44 (33.6%)
			Without albuminuria,.....	87 (66.4%)
		5 to 10 years, .58	With albuminuria,...	21 (36.2%)
			Without albuminuria,.....	37 (63.8%)
		10 to 20 years, .27	With albuminuria,...	9 (33.3%)
			Without albuminuria,.....	18 (66.7%)
		Over 20 years, .5	With albuminuria,...	1 (20%)
			Without albuminuria,.....	4 (80%)
Not examined, 276.				

These figures indicate that albuminuria increases in frequency with the length of time the disease has been present up till ten years, but after ten years its frequency gradually diminishes. This may be partly due to the fact that in cases of long-standing tuberculosis the degree of activity is often slight and the amount of toxins absorbed small.

MORTALITY.

Number of patients treated, 655,.....	With urine examined, 379,	Who died, 37	With albuminuria,....	27 (73 %)
			Without albuminuria,.....	10 (27 %)
		Who are living, .342	With albuminuria,....	89 (26 %)
			Without albuminuria,.....	253 (74 %)
	Not examined, 276.			

The proportion of cases in which albuminuria occurred was nearly three times as great among the fatal as among the non-fatal cases. Or to put it another way: In the one hundred and sixteen cases of albuminuria twenty-seven died (23.3%), while in the two hundred and sixty-three cases of non-albuminuria only ten died (3.8%).

Mixed Infections.—Since mixed infections in tuberculosis and albumin in the urine usually become more frequent as the disease advances, they are necessarily often associated. This does not mean that the albuminuria is always dependent on the occurrence of a mixed infection when the latter is present. Probably, however, the toxins of these secondary organisms, by their action on the kidneys and on the general system, are often responsible for at least a part of the albumin in the urine. At times, and especially when appearing as terminal infections, these bacteria may cause a marked nephritis.

Urinary Casts.—Casts were examined for in our one hundred and sixteen cases of albuminuria, too insufficient a number of times to permit of drawing any conclusions regarding them. From my own study of the urine, however, I may say that they are often present in connection with albuminuria in tuberculosis, that they are not uncommonly quite numerous even when the amount of albumin is small, and that they may occur in the absence of albumin. They usually give more information about the condition of the kidneys than is obtained from a study as to albumin.

In the one hundred and sixteen cases of albuminuria the kidneys were examined microscopically in twenty-one. Of these latter, eighteen had distinct nephritis, usually parenchymatous or diffuse, and three cloudy swelling of the renal epithelium. Walsh,¹⁴ in a study of a hundred cases of tuberculosis, has given a very complete picture of the kidneys in this disease. He has shown that the convoluted tubules present the most marked alterations, consisting of degeneration, disintegration, and necrosis of their

epithelium. He observed every form of nephritis in these cases except hemorrhagic and glomerulo-nephritis.

In nephritis from all causes Cabot²⁴ says that albuminuria is usually present in considerable amounts in subacute and chronic glomerulo-nephritis, quite frequently but less often in acute glomerulo-nephritis, usually in amyloid disease, and in acute degeneration affecting the kidney tubules. Senator⁵ states that in acute nephritis involving only the tubules albuminuria is not a prominent symptom, the opposite, however, being true in acute diffuse nephritis where the Malpighian bodies are much more affected. Welch²⁵ observed the urine after toxic doses of cantharidin to be diminished and finally suppressed, and to contain albumin, hyaline casts, many leucocytes, and red blood-cells, the most marked changes occurring in the glomeruli. Ophüls,²⁷ on the other hand, using a substance particularly adapted to the production of chronic interstitial nephritis, lead acetate, found structures outside the glomeruli especially affected, the urine invariably containing little or no albumin.

Flint¹⁸ gives statistics to show that Bright's disease is very rarely a cause or preceding condition of tuberculosis, but not an infrequent sequel. Senator⁴ believes that, in Berlin at least, of all chronic diseases, tuberculosis is the most frequent cause of chronic parenchymatous nephritis, when the latter is not secondary to acute nephritis.

It seems natural to suppose that the small amounts and often the entire absence of both albuminuria and edema in tuberculosis, in spite of the frequency of nephritis, may at times or in part be explained by the usually normal condition of the glomeruli.

Conclusions.—Albuminuria of renal origin may occur very early in chronic pulmonary tuberculosis, its frequency increasing as the disease advances, and late in the disease it is rarely absent. The amount even in advanced cases is usually only a trace. Large amounts are generally, but not necessarily, of serious import. The absence of albumin does not signify an absence of

nephritis. The albuminuria is apparently due in part to the action of the tubercle bacillus and other bacteria on the kidneys, and probably at times to derangements of the vascular apparatus of the kidneys, even independently of a nephritis. The occurrence of little or no albumin, even with marked nephritis, may be partly owing to the usual normal condition of the glomeruli. Albuminuria is frequently associated with casts in the urine. Edema is not often present and is usually small in amount.

Our statistics regarding albuminuria in tuberculosis suggest the following conclusions: It is more common under ten years and over fifty years. It occurs oftener in the male than the female sex. Of the acute diseases it is seen oftener after scarlet fever and least often after measles. Patients with edema are more apt to have albuminuria than those without. The frequency of albuminuria increases with the length of time the tuberculosis has lasted up to ten years, and then gradually diminishes. A much larger proportion of fatal cases have albuminuria than non-fatal cases, and many more of those with albuminuria die than of those without albuminuria.

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C. M. MONTGOMERY.

SERUM TREATMENT IN TUBERCULOSIS.

In the Second Annual Report we presented an account of the preliminary work done at the Institute with Maragliano serum. That work was done with serum imported from Maragliano's laboratory. The number of cases during the year on which that report was made was entirely too small to permit even tentative deductions and the report was made in such form that the reader might judge for himself of the value of the treatment and might draw his own inferences of prospects held out by further study. The Institute was not prepared to either condemn or approve Maragliano's serum.

Certain untoward symptoms which accompanied the use of the serum raised the question of deterioration in transportation from Maragliano's laboratory to America. For this and other reasons the Institute decided to make its own serum in accordance with Maragliano's methods. The Institute had sent its bacteriologist, Dr. M. P. Ravenel, to Maragliano's laboratory for the purpose of studying Maragliano's methods, and was therefore in a position to make the serum strictly in accordance with the rules and practices of Maragliano himself. Studies here presented have been made with serum produced by ourselves according to Maragliano's methods.

The process of making this serum, in the words of Dr. Ravenel himself, is as follows:

"Cows were selected for the production of serum, since they are less liable to certain accidents of the process of immunization than horses; namely, degeneration of the kidneys and pneumonia.

"Two young and healthy animals were obtained, and after having tested them with tuberculin, the immunization was begun.

This was carried out by means of injections of two preparations, which Maragliano believes contain the sum-total of the poisons formed by the tubercle bacillus. These preparations are called Liquid F. and Bacillary Pulp.

“(1) Liquid F. consists of equal parts of watery tuberculin and the filtrate from bouillon cultures of tubercle bacillus, fully grown,—six to eight weeks old.

“(2) Bacillary Pulp is made from tubercle bacilli grown on glycerine bouillon six to eight weeks. The cultures are filtered, the filtrate being called ‘filtered toxine,’ used in Liquid F. and the bacilli are employed to make ‘Bacillary Pulp.’ For this purpose they are ground in a mortar with cleaned dry sand. When sufficiently ground, cold distilled water is added and the whole is put on a Pasteur-Chamberland filter. The filtrate is sterile and is supposed to contain all the filtrable substances formed in the cell of the tubercle bacillus,—for the most part unaltered by heat. The finished product contains ten parts of water and one of bacilli, by weight.

“Injections under the skin, of these two preparations were given in increasing doses, beginning with 5 c.c. of each. The interval between the injections and the increase in dose was determined entirely by watching carefully the temperature and general symptoms of the animal. The dose was doubled until it reached 20 c.c., when the same amount was used at least twice. The animals were always carefully watched. When the dose is increased too rapidly, parenchymatous nephritis is apt to ensue. Test bleedings were made from time to time and the serum was employed for therapeutic purposes when it was found to contain one thousand antitoxic units per cubic centimeter.

“The human culture employed by Maragliano was used until his standard was reached in the serum. After that a virulent bovine culture of tubercle bacillus was used in the preparation of the two liquids injected. We have not succeeded in obtaining a more potent serum by this means,—as far as our laboratory tests

show. The therapeutic results seem to have been better, however, than those obtained with serum sent from Maragliano's laboratory in Genoa."*

In this report we present thirty-six cases treated by nineteen men, two of whom are throat specialists. The clinicians report on all of the cases and the laryngologists report observations on seven of the cases while these were under treatment by the clinicians. We also make a further report on the cases which were reported on in the Second Annual Report.

Twenty-four cases were treated in the dispensary alone, six in the hospital alone, and six in both. The prognosis of the thirty-six cases treated, when first seen, was favorable in twelve (33.33%); doubtful in fourteen (38.88%); and unfavorable in ten (27.77%). The results of treatment as reported by the men were: improvement in thirteen cases (36%); unimprovement in twenty-three cases (64%).

Most of the cases were treated by the hypodermatic method, but a few were treated by the mouth. Maragliano claims that the serum acts when administered by way of the alimentary canal as well as when administered hypodermatically. The cases which were treated by the mouth are indicated in the table, and a comparative study of these with the cases treated hypodermatically does not seem to sustain Maragliano's claim. One of the cases treated by mouth is reported as having improved, but the man who makes the report says that he does not believe that the serum had anything to do with the improvement. The number here reported on is too small, of course, to warrant conclusions.

The number of doses given, whether by mouth or hypodermatically, ranges from one to sixty-two, and the amount given varies from 1 c.c. to 3 c.c. The usual dose was 1 c.c. In nearly all of

* Since this report was written one of the two cows used for the preparation of the serum has died of tuberculosis. A detailed post-mortem protocol, and if possible an explanation of the development of the tuberculosis, will be published in a later report. Treatment with the serum has been stopped pending investigation.

CASES TREATED.

SERUM PATIENTS TREATED BY:	NUMBER.	NUMBER OF TREATMENTS.	DAYS OF TREATMENT.	TREATED IN HOUSE OR DISPENSARY.	PROGRESS WHEN FIRST SEEN.	FINAL CONDITION.
Dr. Bennett.....	2592 3359	11 by mouth 10 { 3-mouth 7-hypo....	107 42	Dispensary "	Favorable Unfavorable	Improved Unimproved
Dr. Brinton.....	139 182	34 34	112 112	Dispensary Dispensary and House	Doubtful Favorable	Unimproved Unimproved
Dr. Carncross.....	3295 3649	45 62	105 157	Dispensary "	Unfavorable Doubtful	Improved Unimproved
Dr. Craig.....	3799 2019	38 30	91 84	" House.....	Favorable Unfavorable	Improved Unimproved
	3643	22	91	"	"	"
	1092	4	10	Dispensary	Doubtful	Improved
Dr. Cruice.....	1062	30	105	"	"	Unimproved
	3270	20	70	"	Unfavorable	Unimproved
	2146	42	98	Dispensary	Unfavorable	Unimproved
Dr. Cummins.....	2117	42	111	"	Doubtful	Improved
	3635	30	75	"	Favorable	"
Dr. Fetterman.....	2616	26	105	Dispensary	"	Unimproved
Dr. Fetterolf, Laryngologist.....	2139 2019† 3649*	18 30 62	50 84 157	" House Dispensary	Unfavorable Doubtful Favorable	Unimproved Unimproved Improved
	3799*	38	91	"	Doubtful	Unimproved
	2861	28-mouth	98	"	"	"
Dr. Francine.....	3098	17-mouth	59	"	Favorable	Improved
	3211	41-mouth	143	"	"	Unimproved
Dr. Harland, Laryngologist.....	139† 182†	34 34	112 112	" Dispensary and House	Favorable Doubtful	Improved Unimproved
	3635**	30	75	"	Doubtful	"
	1062†	30	105	Dispensary	"	"
	3160	32	105	Dispensary and House	Unfavorable	"
Dr. Hatfield.....	3393	26	91	"	Favorable	Improved
	3647	39	112	House	Doubtful	"
Dr. Irwin.....	2724	21	59	Dispensary	"	"

Dr. Landis.....	{ 3637 3567 3380	22.....	94	House.....	Unfavorable	Improved
Dr. McClary.....	{ 3570 3334 2601	22..... 48..... 26.....	94 180 199	Dispensary	"	Unimproved
Dr. Montgomery.....	{ 3636 3607 3655	25..... 24..... 21.....	213 72 56	"	Favorable	"
Dr. Rhoads.....	{ 3692 3741 2214	1..... 3..... 4.....	3 10 14	Dispensary and House	"	"
Dr. Stanton.....		29.....	101	House.....	Doubtful	Improved
Dr. Ullom.....		14.....	52	Dispensary	Unfavorable	Unimproved

CASES REPORTED ON IN SECOND ANNUAL REPORT.

SERUM PATIENTS TREATED BY:	NUMBER.	NUMBER OF TREATMENTS.	DAYS OF TREATMENT.	TREATED IN HOUSE OR DISPENSARY.	PROGRESS WHEN FIRST SEEN.	FINAL CONDITION.
Dr. Landis.....	1950	12.....	46	House.....	Favorable	Improved
Dr. Stanton.....	{ 2691 2676	34..... 11.....	56 20	"	Doubtful	"
Dr. Walsh.....	{ 1694 1975	27..... 33.....	72 42	"	Unfavorable	Died
				"	"	Unimproved

* Duplicates of Dr. Camerose's cases.

† Duplicate of Dr. Craig's case.

† Duplicates of Dr. Britton's cases.

§ Duplicate of Dr. Crocker's case.

** Duplicate of Dr. Cummins' case.

the cases this was the initial dose at least. In some cases the dose was first increased to 1.5 c.c., then to 2. c.c. and sometimes to 3 c.c. When administered by mouth the dose was usually 2 c.c.

The number of weeks of treatment ranged from one-half week to thirty and one-half weeks. Most cases were given two injections a week; in some the interval was a little shorter, while in others it was a little longer. In a few cases the treatment was suspended for a short time and resumed again.

Maragliano claims that the treatment is equally as available for dispensary as for hospital patients. Our results only in part bear this out. Of the thirteen patients reported as improved, nine were dispensary patients, 37.5% of the patients treated in the dispensary alone, and four were hospital patients, 66.66% of the patients treated in the hospital alone. The hospital patients, moreover, were probably more advanced than the dispensary patients, since only advanced cases are admitted into the hospital, as a rule.

The experience of the Institute would indicate that there is nothing in the application of the serum treatment inconsistent with its use in dispensary cases. The patient can come to the dispensary, receive his injection, rest a while, and return home without any danger or discomfort. One of Dr. Montgomery's cases, on which he reports in detail, well illustrates this point. Dr. Montgomery writes of this case: "In observing any variation that took place during treatment, we must bear in mind a certain tendency to nervousness on the patient's part, a tendency, however, that became aggravated. Her attitude toward the serum was somewhat prejudiced by those at home. In addition she had a long way to come, between three and four miles, covered, however, by convenient trolley transit and in weather usually fair. It is questionable whether this, combined with the slight worry due to receiving injections, and the frequent exposures from the removal of clothing, could have had any material depressing influence."

Of the seven cases under observation by the laryngologists

only one was reported improved by a laryngologist. This case (No. 3799) was also reported improved by the clinician. Case No. 139, which is reported improved by the clinician, is reported unimproved by the laryngologist, and another (No. 1062), which is reported temporarily improved by the clinician, is reported unimproved by the laryngologist.

Both the clinicians and the laryngologists, so far as their detailed reports reflect their views, seem to be doubtful of the value of the serum in the treatment of tuberculosis. None have expressed a definite opinion, most of them lean to the side that the serum has no value, some make no comment, and a few seem to think it has some value.

Dr. Carncross says of case No. 3295: "The general condition remained the same. The lungs by the light of physical examination alone revealed a very slight improvement, but as it was so slight, allowance must be made for possible error. There was at least no ground lost." Dr. Cruice winds up his report by saying: "Judging from my small experience of three cases of more or less advanced state, I would say that the serum was not of very high therapeutic value in cases of this type."

Dr. Cummins made a blood study of his cases and reports his conclusions as follows: "Case No. 2146 was benefited by the serum. His weight has increased and his general condition seems improved. Case No. 2117 was not benefited. His condition remains practically the same as it was previous to the treatment. Case No. 3635 was not benefited. Temperature and pulse have been higher than before and his condition is much worse. On account of the small number of patients under observation and my inability to make a larger number of blood examinations, this work does not in any sense stand as an exhaustive study of the blood in such cases. There seem to be, however, a few changes to be noted which may be due to the serum. Large doses (4.5 c.c.) of serum depress markedly the leucocyte count. An increase of eosinophiles and basophiles is likely to occur after the first

few doses of serum. Favorable cases are likely to show the eosinophilia more markedly than the unfavorable ones. It is probable that the increased eosinophile count may be a criterion of the relative immunity of the patient."

Dr. Francine reports: "So far as I was able to observe from a long study of these three cases, before and after institution of serum treatment, there was no marked improvement, and what little improvement there was in Case No. 3211 could not be attributed to the serum."

Dr. Hatfield writes of Case No. 3160: "Result of serum in this case is negative, as progress made while under treatment was no more than that made under ordinary hospital routine." Of case No. 3393 he writes: "Result of treatment negative. The gain in weight under treatment was no more than under ordinary hospital routine. On the other hand, the unfavorable course of the disease while under treatment was only what could have been foretold from the course of the disease before the serum treatment was given." Of case No. 3647 he writes: "The sudden increase in weight after the beginning of the injections may be significant. The result, as far as improvement in the other signs is concerned, was probably no better than could have been expected for this patient under the ordinary hospital routine."

Dr. Landis concludes his report of case No. 3637 by saying: "Taking into consideration the great extent of the disease in this patient (involvement with cavity formation of one lung and the apex of the other) the eventual lowering of the temperature and the pulse-rate with the return of the menses must be looked upon as encouraging, and I think the serum was of considerable benefit." Of Case No. 3567 he writes: "In this case, however, there was decided improvement in the physical signs, manifested by less dulness and fewer râles. The case, I think, can be set down as being distinctly benefited by the serum."

Dr. McClary writes of Case No. 3380: "I can ascribe no marked benefit to the serum"; of Case No. 3570: "Serum has

been of no use"; and of Case No. 3334: "Serum has not benefited this case. He was doing as well or better before it was started than after."

Dr. Montgomery summarizes case No. 2601 as follows:

"1. There was some slight local reaction at the start, probably due to the serum.

"2. In no particular did the patient improve during or after the treatment.

"3. Respiration was more rapid during and after treatment than before.

"4. Pulse was more rapid after treatment than before.

"5. Temperature was higher during and after treatment than before.

"6. Dyspnea, dulness, and nervousness were more pronounced during and after treatment than before.

"7. There was loss of weight after the treatment.

"8. Tubercle bacilli were found in the sputum on two successive occasions during the treatment and not before.

"9. There was more frequent expectoration of blood-tinged sputum after the treatment than before and there was one hemorrhage during the treatment.

"10. Signs of activity of the process in the lungs were more marked, especially on the left side, during and after the treatment than before. They were, however, more persistently and possibly more diligently sought for.

"11. The patient's condition was more consistently unfavorable during and after the treatment than before. Explicable:

"(a) As the result of the serum.

"(b) As the result of disease processes entirely independent of the serum (for example, intercurrent colds) and purely coincidental. To which of these to attribute the unfavorable course it is impossible to determine."

Of case No. 3336 he writes in his summary:

"1. There was no improvement in any particular.

"2. On the whole, the patient was worse during and at the end of the treatment than at the beginning of it, as shown mostly by loss of weight, to a less extent by pain in the side and by an increase in weakness.

"3. To trace any direct connection between the backward course and the serum would be impossible; but there is no feature of the case which would give one a favorable impression of the serum. If anything, the evidence would weigh on the other side.

"4. There was no local reaction from the serum."

Dr. Stanton writes of his case: "Very marked and distinct improvement in this case seems to me to be due largely to the serum."

The laryngologists who report on the cases seem to have formed somewhat divergent opinions of the value of the serum.

Dr. Fetterolf concludes:

"1. Laryngeal tuberculosis is benefited by the use of the serum.

"2. The earlier the case is treated, the better and more lasting is the influence exerted by the serum.

"3. A tendency to relapse should be met by an increase in the dose of the serum.

"4. Increase of the dose seems to check the relapse.

"5. The serum should be regarded as an adjunct, and its use should be combined with the most enlightened methods of general and local treatment." He says of his conclusions, however, that "it should be remembered that these are based on the observation of but three cases, and that a wider experience may cause them to be modified."

Dr. Harland writes of his four cases: "As far as the cases under my care were concerned, I would say that the effect upon the nose and throat was negative. The only case that showed improvement could be explained on other grounds."

The complications reported were swelling, rash, pain, herpes zoster, glandular enlargements, hemoptysis, pleurisy and abscess

formation. Swelling at the seat of injection, accompanied by pain, took place in cases Nos. 1062, 2601, and 3160. A rash came out in cases No. 2601 and 3567. Pain was complained of by cases Nos. 139, in the joints, and 3649 and 3643 in the lumbar region, in the form of lumbago. Case No. 3649 had herpes zoster. Cases Nos. 3647, 3567, 3693, 3637, 2146, and 2117 had enlargement of the axillary glands. Cases Nos. 3393, 2601, 3334, 3380, and 3741 had hemoptysis; and cases Nos. 2601, 3636, 3160, and 3393 had pleurisy. Abscess formation took place in cases Nos. 182, 1062, and 3295. In case No. 3637 dyspnea and cyanosis followed the injection.*

Many of the complications enumerated here, no doubt, are evidences of reaction from the serum, although all have not been put down as such. Some may have been due to accidental mixed infection, with which the serum had nothing to do, unless perhaps as a predisposing cause. On these points it is at present impossible to say anything definite. Reaction as indicated by fever is recorded by a number of the men, but is not recorded by all of them. There is reason to believe that some may have overlooked it, particularly as no very systematic temperature record was kept in the dispensary cases. Of the cases in which a reaction is recorded, it appears to have come on somewhat late at times, even after two or three injections had been given. In view of this fact, it is quite possible that temperature reaction may have come on in some of the cases when it was not looked for, and therefore remained unrecorded. In the records of some of the cases, moreover, mention is made of the patients having taken cold, and it is conceivable that what was recorded as a cold may really have been a reaction with some increase of temperature.

Of the conditions put down as complications, hemoptysis, pleurisy, and enlargement of the lymphatic glands occurred most frequently. All of these may really be looked upon, in a sense at

* The data in this paragraph were collected by Dr. W. B. Stanton.

least, as evidences of reaction. In connection with hemoptysis the question has come up whether or not the serum predisposes to it by making soil for the micro-organisms which may have to do with hemoptysis. The occurrence of pleurisy can perhaps best be interpreted upon the basis of a stimulation into activity of an infection which is already in existence. However, on all these points much work will have to be done before definite conclusions can be reached.

The complication of dyspnea and cyanosis is a most peculiar one, difficult to interpret, and most distressing to both the doctor and the patient. Dr. Landis describes it as follows: "Two or three minutes after the injection was given, the patient suddenly became dyspneic and cyanotic, and was unable to lie down. The lips and fingers became blue and the face was deeply congested. Within a minute or so more she became nauseated and vomited. The cyanosis then cleared up and was followed by extreme pallor. The pulse was extremely rapid and almost imperceptible at the wrist." While this is the only instance of this complication or accident recorded in this series of cases, it has occurred in other cases, and the phenomena are always practically the same. In none of the cases in which it has occurred have the consequences been serious.

Of the five cases on which we reported in the Second Annual Report, case No. 1694 is now in fair condition of health; case No. 1975 has re-entered the hospital in dying condition; case No. 2691 is well, following his former occupation as teacher in a home for boys; case No. 2676 is dead; and case No. 1950 is in a declining condition of health. All of them except case No. 2691 were rather advanced cases when they came under serum treatment. Case No. 2691 seems to be in perfect health and has stood a fair test of resistance against relapse by following his usual occupation.

Case No. 2676 died in the hospital on April 23, 1905, and came to autopsy. The autopsy report is made by Dr. C. Y. White as follows:

Pathological diagnosis: Chronic fibroid pleurisy with adhesions, purulent pleurisy (early stages of empyema), fibrous pleurisy, chronic tuberculosis of the lungs with cavity formation and fibroid changes, tuberculosis of the larynx, atheroma of aorta, amyloid liver with miliary tubercles, tuberculous enteritis, tuberculous appendicitis, amyloid intestines, amyloid kidneys with diffuse nephritis and tubercles, amyloid spleen with miliary tubercles, amyloid lymphatic glands.

External appearance: Body of greatly emaciated man, post-mortem rigidity present, post-mortem lividity in dependent portions, slight cyanosis in finger-tips and lips, subcutaneous tissue normal, inguinal glands palpable.

Internal appearance: The abdominal and thoracic muscles are poorly developed. Preperitoneal adipose tissue is present, but in very slight amount. The position of the internal viscera is normal, with the exception of the heart, which is displaced to the left. Height of the diaphragm on the right the fourth interspace; on the left the fourth rib.

Pleura: Left pleura is obliterated throughout, with the exception of a small area at the second rib. Right pleura shows general adhesions over the upper and partly over the middle lobe. Below this the pleural cavity contains about twelve ounces of slightly cloudy, yellowish fluid.

Left lung, upper lobe: Two-thirds of the lobe is consolidated, showing numerous areas of caseation and areas of bronchopneumonia. Deep in the lobe there are numerous small cavities, many of which communicate. The majority of these cavities are filled with muco-pus. One-third of the lobe is air-bearing. **Lower lobe:** One-half the lobe is consolidated, showing areas of caseation and bronchopneumonia. It contains one cavity measuring 2 by 1.5 by 0.5 cm., situated along the upper border of the lobe and in a position corresponding to the mid-axillary line. The walls of the bronchi show moderate thickening.

Right lung, upper lobe: The whole lobe is generally compressed and about one-half consolidated. The consolidation consists of numerous large and small tubercles. The larger tubercles are distinctly encapsulated, and the contained caseous material is dryer than is usually found in these cases. **Middle lobe:** Generally the same as upper lobe. **Lower lobe:** The greater part of this lobe is compressed by the sacculated empyema found in the pleura. The lobe shows a few miliary tubercles and is elsewhere congested.

The larynx shows advanced ulceration along both cords and the trachea shows slight congestion. The pericardium is generally normal. The heart is pushed slightly to the left, is normal in shape, measures 10 by 11 by 4 cm., weighs 295 g., and is otherwise normal. The mouth and teeth are in fairly good condition. The nose and pharynx are externally normal. The thyroid is

of normal size, consistency, and color. The thymus gland is atrophied. The esophagus is normal. The omentum contains a slight amount of fat. The peritoneum is normal.

The liver measures 29 by 30 by 7.5 cm. and weighs 2325 g. The surface is smooth, the edges round. The consistency is very firm. Section surface shows the organ dry, smooth, and opaque. The color varies from a yellowish to a yellowish-red. The amount of blood is not increased. It is greatly enlarged and extends 9.5 cm. below the xiphoid and 8 cm. below the costal margin in the mid-clavicular line. The whole organ shows a diffused amyloid change and the section surface shows a few small yellowish tubercles. The gall-bladder is generally negative. The small intestines show irregular areas of congestion and a few small ulcers which increase in number toward the ileocaecal valve, the majority being especially prominent in the lower one-half of the ileum. The head of the caecum contains numerous large irregular ulcers. The rectum shows a slight prolapse. The appendix measures 7 cm., points toward the left side of the body and then toward the left shoulder. At the tip of the caecum the mucous membrane is congested and shows numerous ulcers. The pancreas measures 18 by 4.5 by 2 cm., weighs 155 g., and is slightly congested.

The right kidney measures 11.5 by 6.5 by 3.5 cm., weighs 202 g., and is moderately congested. The cortex is cloudy and contains a few 1 to 2 mm. tubercles. The left kidney measures 12.5 by 5.5 by 3.5 cm., weighs 202 g., and is similar to the right. Both ureters are normal. The suprarenal glands are negative. The bladder is normal. The genitalia are normal.

The spleen measures 13.5 by 8 by 3.5 cm., weighs 217 g., and is of normal shape. The consistency is soft, the capsule is smooth, the trabeculae are slightly prominent. The color is slightly red. The pulp is soft and red, the follicles are moderately prominent. It contains a few small miliary tubercles on the surface and throughout the organ and a moderate amount of amyloid degeneration.

The cervical glands are not enlarged. The bronchial glands are moderately enlarged and anthracotic. The mesenteric glands are moderately enlarged and firm.

Histological examination: Sections of the lung show a chronic tuberculous process. The tuberculous lesions show varying degrees of caseation. The peripheral lesions show a considerable amount of connective tissue with numerous dilated capillaries. Small areas of amyloid degeneration are observed in some parts of the connective tissue. The amount of connective tissue is greater than that generally found in the cases at the Institute.

The heart muscle fibers are generally normal, with the exception of a slight

hypertrophy of a few nuclei. Sections of the liver show a diffused amyloid change. The remaining liver cells are generally cloudy and somewhat hypertrophied. Throughout the sections there are a few tubercles which show, at the periphery, a distinct increase of connective tissue. Sections of the intestines show slight congestion and slight amyloid change, but no tubercles. These sections were taken for the study of the general condition, and not of the tuberculous ulceration. Sections of the appendix show tuberculosis situated in the lymphoid tissue of the mucosa.

Sections of the pancreas show marked post-mortem changes, which especially involve the connective tissue. The organ is otherwise negative. Sections of the spleen show congestion, numerous areas of amyloid change, and a few small tubercles. Sections of the kidney show the glomeruli to be swollen, congested, and Bowman's capsule to contain an exudate. Other areas show amyloid reaction, or are distinctly atrophied. The uriniferous tubules of the cortex show general cloudiness, and here and there distinct granulation or complete necrosis. The medulla shows a slight increase of connective tissue.

Sections of the suprarenal show areas of congestion and marked fatty change in the outer zone. The thyroid shows an increase of fibrous tissue throughout the organ. Sections of the mesenteric glands show numerous tubercles, the periphery of which shows considerable fibrous tissue. Amyloid changes are also found.

As to the possible influence of serum on chronic pulmonary tuberculosis, Dr. White writes of this case:

"Unfortunately, the great amount of tuberculous involvement in this case, especially the secondary changes produced by the tuberculosis, make it difficult to draw any striking conclusions as to the value of the serum. The lesions, however, were generally dryer and firmer than found in the usual case. Histologically, the medium-sized tubercles showed considerable fibrous tissue surrounding them, which might be considered as an evidence of healing. The wide-spread amyloid change in the liver, and, to a less extent, in the spleen, and the sacculated empyema of the right pleura, seemed at the time of the autopsy, to be more responsible for the patient's death than did the tuberculous lesions in the lungs. The occurrence of so few cavities, and of this general type of sub-acute and chronic tuberculosis, is unusual in our class of patients."

The work which has been done at the Institute with the Margliano serum, over a period of two years, seems to be unfavorable to the serum. It will not do, however, to jump at the conclusion from this work that the serum has no value in the treatment of tuberculosis. All we can say is that it is of no practical value according to our present method of using it. Facts crop out here and there, in the work which has been done, suggestive of good and indicative of perhaps better ways of using it. Some of our men seem to think that smaller doses and longer intervals would give better results. Our pathologist, by his histological studies of the tissues of cases treated with the serum, has developed a strong bias in favor of the serum, and some of our men who have had a prejudice against it from their use of it in the beginning, are more favorably disposed to it. Under these conditions, the Institute will continue its experimental work with the serum.

LAWRENCE F. FLICK.

LARYNGOLOGICAL WORK.

Total number of cases examined, 270, ...	Tuberculous, 262, ...	Tuberculosis of upper respiratory tract, .64	Tuberculosis of larynx,.....60
			Tuberculosis of nasal septum,..... 1
			Tuberculosis of pharynx,..... 1
Non-tuberculous, 8		No tuberculosis of upper respiratory tract, .198	Tuberculosis of pharynx, tonsils, and larynx,..... 1
			Tuberculosis of pharyngeal tonsil,.... 1

SUMMARY FOR THREE YEARS.

Total number of cases examined, 680,	Tuberculous, 648, ...	Tuberculosis of upper respiratory tract, ...231	Tuberculosis of larynx, ...218	Diagnosis positive,.....188
				Diagnosis not positive,.... 30
			Tuberculosis of nasal septum,.... 1	
Non-tuberculous, 32		No tuberculosis of upper respiratory tract,.....417	Tuberculosis of pharynx,..... 3	
			Tuberculosis of pharynx, tonsils, and larynx,..... 1	
			Tuberculosis of pharyngeal tonsil, 4	
			Tuberculosis of faucial tonsil,.... 1	
			Tuberculosis of larynx and pharyngeal tonsil,..... 1	
			Tuberculosis of larynx and faucial tonsil,..... 1	
			Tuberculosis of larynx and pharynx,..... 1	

LOCATION OF THE LESIONS IN THE LARYNX.

The arytenoid of one side,.....	1
The arytenoid and ventricular band of one side,.....	5
The arytenoid, ventricular band and vocal cord of one side, ...	3
The arytenoid and aryteno-epiglottic fold of one side,.....	1
The ventricular band of one side,.....	1
The ventricular band and vocal cord of one side,.....	3
The arytenoids of both sides,.....	4
The arytenoids of both sides and the space between them, ...	7
The space between the arytenoids,.....	3
The arytenoids and vocal cords of both sides,.....	2
The arytenoids, the space between them and the vocal cord of one side, 2	
The arytenoids, the space between them and the epiglottis,.....	1
The vocal cords of both sides,.....	4
The vocal cords of both sides and the space between the arytenoids,.... 2	
The epiglottis,.....	1
The entire larynx,.....	14
Incomplete examination, ...	5

FORM OF LESION.

In the sixty cases of tuberculous laryngitis the form of lesion was:

Congestion,.....	3
Erosion,.....	1
Infiltration,.....	31
Infiltration and edema,.....	2
Infiltration and erosion,.....	1
Infiltration and ulceration,.....	9
Infiltration, ulceration and edema, ...	7
Ulceration,.....	2
Not recorded,.....	4

Hyperemia was present to a greater or less extent in all the cases.

NON-TUBERCULOUS LESIONS IN TUBERCULOUS CASES.

In the one hundred and ninety-eight cases of non-tuberculosis of the upper respiratory tract the examination revealed:

Adenitis from tooth infection,.....	1
Aphonia, hysterical,.....	1
Cerumen, impacted,.....	3
Examination impossible,.....	4
Examination negative,.....	1
Ethmoiditis, chronic catarrhal,.....	1
Globus hystericus,.....	1
Laryngitis, chronic catarrhal,.....	9
" chronic hyperplastic,.....	1
" sclerotic,.....	1
" subacute catarrhal,.....	11
Laryngo-tracheitis, chronic catarrhal,.....	6
" subacute catarrhal,.....	3
Larynx, fibroma of,.....	1
Otitis media, acute catarrhal,.....	2
" " chronic catarrhal,.....	9
" " chronic purulent,.....	4
" " chronic purulent, with adenoids,.....	1
" " subacute purulent,.....	1
Perforation of membrana tympani, old,.....	1
Pharyngitis, acute catarrhal,.....	1
" chronic catarrhal,.....	3
" follicular,.....	3
" lateral,.....	2
" rheumatic,.....	1
" sclerotic,.....	3
Pharynx, tertiary syphilis of,.....	1
Polypi, nasal mucous,.....	6
Rhinitis, atrophic,.....	9
" hyperplastic,.....	5
" vasomotor,.....	5

Rhino-pharyngitis, atrophic,.....	1
“ chronic catarrhal,.....	19
“ sclerotic,.....	10
“ subacute catarrhal,.....	8
“ vasomotor,.....	1
Septum, nasal, deflection of,.....	19
“ “ with perforation,.....	1
“ “ with spur,.....	1
“ erosion of,.....	3
“ ridge of,.....	4
Sinusitis, chronic antral,.....	1
“ chronic frontal,.....	1
Tonsil, faucial, hyperkeratosis of,.....	1
“ “ hyperplasia of,.....	6
“ faucial and pharyngeal, hyperplasia of,.....	8
“ lingual, hyperplasia of,.....	5
“ pharyngeal, hyperplasia of,.....	5
Tonsillar crypts, chronic occlusion of,.....	1
Tonsillitis, acute lingual,.....	1
“ chronic lacunar,.....	1
Tracheitis, chronic catarrhal,.....	1

NON-TUBERCULOUS LESIONS IN NON-TUBERCULOUS CASES.

Examination negative,.....	1
Laryngitis, chronic catarrhal,.....	2
Tonsil, faucial, hyperkeratosis of,.....	1
“ faucial and pharyngeal, hyperplasia of,.....	1
“ pharyngeal, hyperplasia of,.....	2
Septum, nasal, ridge of,.....	1

FOUR CASES OF EXTRALARYNGEAL TUBERCULOSIS OF THE UPPER AIR-PASSAGES.

TUBERCULOSIS OF THE NASAL SEPTUM.

Case No. 3699. Male. Age, fourteen. This patient complained of severe bregmatic headache, dropping of mucus into the nasopharynx, obstruction to respiration in both nostrils, pain, soreness, and dryness in both nostrils, and blood-tinged mucus coming from both sides of the nose.

Examination revealed enlargement of the upper deep cervical lymph-nodes and tenderness over the right side of the nose and canine fossa. The fauces were slightly congested, the faucial tonsils small, and the lingual tonsil slightly enlarged. The larynx was negative.

The nasal septum showed a large perforation in the cartilaginous portion, with ulcerated edges and marked infiltration posteriorly, especially on the right side. The right nasal fossa was obstructed by the thickening at the posterior border of the perforation.

TUBERCULOSIS OF THE PHARYNX.

Case No. 3677. Female. Age, twenty-three. This patient complained of dryness of the throat, especially at night. There was some postnasal discharge and some soreness beneath the bridge of the nose. Nasal respiration was free. There had been aphonia once during childhood, hoarseness and dysphonia for the two weeks preceding the examination, and occasional odynphagia.

Examination showed slight localized tenderness at the angle of the mandible, enlargement of the tonsillar cervical lymph-nodes, slight coating of the tongue, fair dental condition, and slight deflection to the left of the nasal septum. There was a mild degree of congestion of the fauces, with slight enlargement of the faucial, lingual, and pharyngeal tonsils. The lateral pharyngeal folds were congested and thick and the pharyngeal vault slightly congested. The choanæ were free. The lingual veins were somewhat dilated and the right ventricular band was thickened.

On the posterior pharyngeal wall were several areas of tuberculous infiltration with superficial ulceration.

TUBERCULOSIS OF THE TONSILS, PHARYNX AND LARYNX.

Case No. 3256. Female. Age, twenty-seven. The symptoms complained of in this case were dropping of mucus from the posterior nares, pain radiating from the throat into the ears, a feeling of soreness, dryness, heat, and burning in the throat, aphonia for three months, hoarseness and dysphonia for six months, and odynphagia for a year. There was occasional slight tinnitus in the left ear.

Examination showed absence of any tenderness to external pressure, marked enlargement of the upper deep cervical lymph-nodes, negative nasal septum, slight nasal sclerosis, and caries of several teeth. The pharyngeal vault was congested, the pharyngeal tonsil was enlarged, and the lingual veins showed a tendency to varicosity.

The posterior pharyngeal wall was the site of two ulcers with infiltrated bases and some sloughing. On the right lateral pharyngeal fold was a large ulcer with an infiltrated base. The right faucial tonsil showed numerous and the left a few miliary tubercles beneath the mucosa. The larynx was extensively infiltrated and ulcerated.

TUBERCULOSIS OF THE PHARYNGEAL TONSIL.

Case No. 2121. Male. Age, twelve. The symptoms complained of by this patient included impaired nasal respiration, slight anterior and poste-

rior nasal discharge, some tickling in the pharynx, and occasional tinnitus in the left ear.

Examination showed enlargement of the external upper deep lymph-nodes of the right side and of the tonsillar lymph-nodes of both sides, especially the left. The nose was the seat of slight excoriation of the vestibules and erosion of both sides of the nasal septum. The turbinals were contracted. The faucial tonsils were enlarged and embedded and the fauces and lateral pharyngeal folds were congested. The lingual tonsil and lingual veins were small and the larynx was negative.

The pharyngeal vault was covered with muco-pus, removal of which showed the pharyngeal tonsil to be small and pale and the seat of some small white spots on its surface.

By well directed treatment of the nose and throat of the tuberculous patient, in which the close coöperation of the attending physician and the laryngologist is essential, much can be accomplished. A brief résumé of the principles underlying the treatment of these cases and the practice as carried out at the Phipps Institute is appended.

Standing as does the nose at the very portal, and being, as it is, the quarantine station of the respiratory tract, the importance of having its functional integrity maintained is obvious. The frequency of nasopharyngeal conditions demanding attention is illustrated in the report for the past year, there being present twenty-three cases of sclerotic and atrophic and twenty-six cases of septal obstructive conditions in the one hundred and ninety-eight non-tuberculous lesions found. This points out the first desideratum to be obtained—free and normal nasal respiration. This includes the reduction or removal of all soft obstructing tissue and the use of such sedative and cleansing measures as will best suffice to keep the nasopharyngeal mucosa in good condition. Routine cleansing is advisable, especially in the city dwellers, for reasons which are more than evident.

Hard obstructions, such as irregularities in position or contour of the septum and bony hyperplasias of the turbinated bodies, must be dealt with according to the conditions present in the indi-

vidual case. When the pulmonary disease is incipient, systemic resistance good, and the degree of nasal obstruction sufficient to cause mouth-breathing with its attendant evils, the offending lesion should be removed. Should the lung condition be advanced, palliative treatment only is indicated.

The pharynx receives routine attention. Lymphoid hyperplasia is noted, and if the cervical lymph-nodes are enlarged special attention is bestowed on the structures comprising the lymphatic ring of Waldeyer. The house cases have their pharynges rubbed routinely with eucalypti oil, and in both house and dispensary cases diseased tonsils are extirpated and enlarged lymphatic islets destroyed.

In tuberculous disease of the larynx much can be accomplished and upon the early recognition of laryngeal involvement as much emphasis should be laid as upon similar stages of pulmonary lesions. Cases in which there are symptoms indicating laryngeal irritation and in which inspection reveals congestion, slight enlargement of the arytenoids, and even a suspicion of thickening in the interarytenoid region, comprising that group in which the laryngologist halts between a diagnosis of chronic catarrhal laryngitis and incipient laryngeal tubercle, receive special attention. The mucosa being already eroded, a favorable field is present for the implantation of the bacillus, while prompt attention will often result in their clearing up and the averting of a most serious complication.

When tubercle becomes evident in the larynx non-use of the voice, the "Schweigekur," is strongly urged upon the patient. In a certain proportion this can be attained, but when the industrial and social conditions surrounding the majority of the Phipps Institute patients are considered the proportion possible is rather small. If non-use is unattainable, restriction is insisted upon, and all singing and loud calling forbidden. A nasal wash is ordered and the patient reports for regular treatment. In the milder cases this consists of thorough nasal treatment and the

intralaryngeal use, either by means of the applicator or by instillation, of usually solutions of the colloidal silver salts or of methylene-blue, the former of a strength of 10% to 30% and the latter 2% to 4%.

When infiltration becomes well marked and the mucosa remains unbroken, the use of the galvano-cautery needle, as recommended by Gruenwald, has been found very efficacious. The area affected is cocaineized and the white-hot needle sunk into the tissues in one or more places. After slight reaction for a few days cicatrization and contraction are instituted and quite large masses become small and innocuous.

Tuberculomata are removed either instrumentally, if their contour will allow of it, or destroyed by the galvano-cautery.

Ulcerations, if superficial, will frequently disappear under the use of the remedial measures mentioned above, but if caused by the breaking down of tubercles are cauterized by the galvano-cautery. Chemical escharotics are rarely used.

GEORGE FETTEROLF.

NEUROLOGICAL WORK.

The neurological work for the year 1905 embraces:

(A) A study of the gross and microscopic lesions of the central and peripheral nervous system of thirty-two patients.

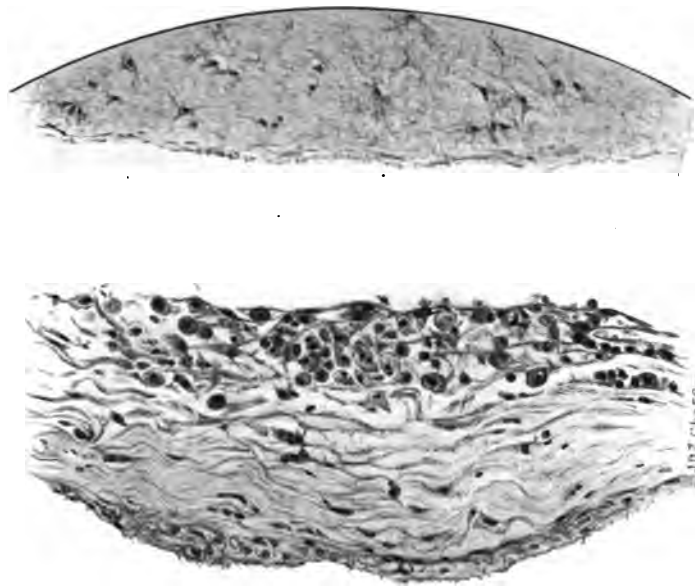
(B) A study of the clinical manifestations of one hundred and seventy-six patients. Cases 2676 and 3440, included in this year's report and properly belonging to it, were reported on in the Second Annual Report. The reason for this will be found on pages ninety-three and ninety-four of the Second Annual Report.

ACUTE LEPTOMENINGITIS.

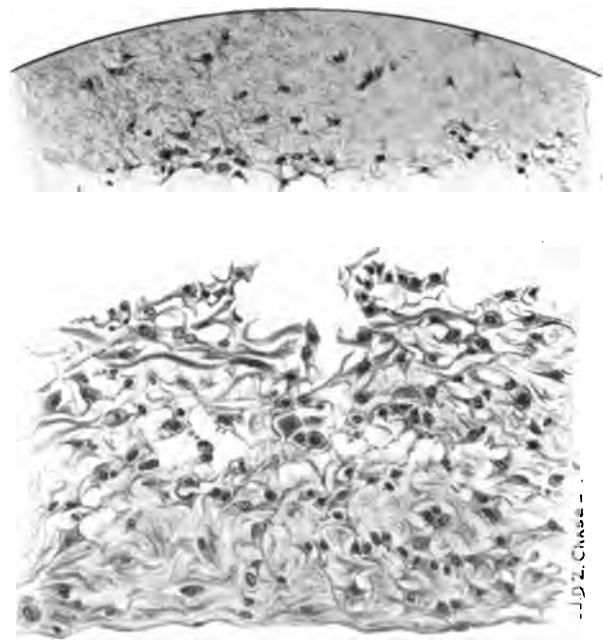
Number of brains upon which report is based.....	32
Number of cases.....	6

Of these six cases of tuberculous meningitis, only two were of the usual type, the other four presenting localized areas of meningitis. One of the four cases, No. 3440, a case of unilateral tuberculous meningitis, was included in the Second Annual Report. The other cases of localized tuberculous meningitis are as follows:

Case No. 781. Over the base of the brain there is evidence of a recent acute leptomeningitis with slight infiltration and capillary hemorrhages beneath the pia, extending into the tissues. This is much more marked around the optic commissure and in the Sylvian fissure than elsewhere. The process was very active. Over the convexity, and more especially in the sections taken from the motor area, there is a very marked thickening of the pia-arachnoid, the result either of an old acute process, or of a chronic progressive process. The microscopic appearance is decidedly in favor of a healed acute process. The thickened pia is not the same dense fibrous



Case No. 363. Chronic leptomeningitis with recent active productive meningitis. Hämalaun-eosin stain.



Case No. 781. Proliferating areas of productive meningitis. Hämalaun-eosin stain.

tissue as is seen in the progressive process, but has a large number of nuclear elements. These nuclei are for the most part in the connective-tissue cells. Scattered here and there, however, are epithelioid cells within the meshes of the connective tissue. This tissue differs from that seen in the productive form of an acute leptomeningitis in the rarity of the amorphous cell elements and the pooriness of the blood-supply. In these areas of productive meningitis there is a marked endarteritis. The granules in the choroids have the appearance of early tubercles, but it is impossible to state positively that they are such. There is a recent very marked leptomeningitis over the cerebellum. There is also a recent acute leptomeningitis over the cervical spinal cord. This is not so marked as that seen in the cerebellum and gradually disappears as the dorsal part of the cord is reached.

Case No. 3163. There is an area of subacute leptomeningitis over the prefrontal lobe. This occurs immediately beneath an area of chronic leptomeningitis and is associated with considerable edema. Beneath an area of very marked fibrous thickening of the pia-arachnoid, there is an accumulation of small round cells and a newly formed reticulum containing large numbers of free red blood-corpuscles and small blood-vessels. The meninges over the base are perfectly normal. Over other areas of the cortex the meninges do not show this productive inflammatory condition.

Case No. 2481. There is a recent productive leptomeningitis, more marked over the convexity and prefrontal lobe, and a lesser grade of a subacute leptomeningitis over the lateral and inferior surfaces of the brain.

SUBACUTE LEPTOMENINGITIS.

Number of brains examined.....	32
Number of cases.....	24

Of the cases of subacute leptomeningitis, the exudate in eleven was so slight as to simply produce a roughening of the meninges on gross examination. In two the exudate was sufficiently marked to lead to the assumption that a distinct proliferative process had taken place. In the other cases there was a marked grade of roughening. The microscopic examination of these is exemplified by the following case: In case 3435, besides the fibrinous exudate on the pia-arachnoid, which is very slight, there is a distinct proliferation of connective-tissue cells on the under surface, composed mainly of active tissue elements and containing

a moderate number of round nuclei. In cases where the exudate is thickest the microscopic picture shows a layer of granular material containing a few small round nuclei. In this there is evidence of proliferation of the cells of the meninges.

CHRONIC LEPTOMENINGITIS.

Number of cases examined.....	32
Number of cases.....	5

Of the five cases of chronic leptomeningitis, four affected the convexity and one was localized to the posterior and middle fossæ at the base of the brain. The gross appearance of these cases ranged from a decided opacity with a distinct thickening to a moderate grade of milkiess of the pia-arachnoid. There did not appear to be any relation between the leptomeningitis and the sub-pial edema. In cases of marked atrophy of the cortex where we are justified in assuming that the edema has been of long standing there is some evidence in favor of the production of a thickened condition of the pia. Such a case is No. 106, the microscopic appearance of which is as follows:

The pia-arachnoid is composed of a thin outer fibrous layer in which the connective-tissue cells present a long thin type of nucleus. Immediately beneath this the connective tissue is still dense, but the nuclei are more numerous, not so long, and in many instances elliptical and even round. This gradually fades into a loose reticulum.

ATROPHY OF THE CORTEX.

Number of brains examined.....	32
Number of cases.....	15

The very marked loss of body-weight which is the rule in advanced cases of pulmonary tuberculosis is participated in by the brain as a whole; but a careful study of the brains at our disposal at the Institute shows that this loss of substance is not uniform. It is more marked in certain areas than in others. The conducting paths no not appear to suffer; the pons and



Case No. 106. Showing a moderate grade of atrophy of the cortex, with chronic leptomenigitis of the convexity.

medulla usually show the appearance of normal size. The same is true of the cerebellum and the structures in the posterior part of the brain. There is usually, however, an appearance of marked wasting in that portion of the brain anterior to and including the motor area. This loss of substance is much greater on the superior portion of the convexity and sometimes affects the anterior portion of the superior parietal lobe in such a way as to give the appearance of a distinct localized depression in this area. The prefrontal lobe, as a rule, suffers most. The wasting in this area is often as marked as that seen in most cases of dementia paralytica. The intracranial area caused by this loss of brain substance is filled by cerebrospinal fluid. This accounts to a great extent, although not entirely, for the cerebral edema and thickening above mentioned. The microscopic examination of the brain showing the most marked change in appearance is as follows:

Case No. 106. The study of microscopic sections of the most advanced case of atrophy shows a loss in all of the constituent parts of the cortex. The ganglion cells are fewer in number. There seems to be a distinct loss in the deep pyramidal layer. The appearance of the cortex is that of a rarefaction. There is a distinct loss of neuroglial tissue. There is no evidence of sclerosis. The pericellular and perivascular spaces are widely distended and there are large numbers of vacuoles scattered throughout the cortex. The perivascular spaces confined to the cortex are markedly distended. In the perivascular spaces elements of neuroglia can be seen bridging these spaces to the walls and blood-vessels, so that the condition is evidently an absorption process. While the atrophy is very marked, the tangential fibers are distinct.

In moderate cases of atrophy the tangential fibers form a fine process line along the margin of the cortex more distinct than is seen where no atrophy occurs. In sections stained for elastic tissue, the blood-vessels do not reveal any evidence of distinct change in the areas of atrophy. By the Weigert stain, in case No. 106, elastic fibers in considerable numbers are presented in the pia-arachnoid.

EDEMA.

Number of brains examined.....	32
Number of cases.....	15

Of the fifteen cases presenting edema, six were graded as marked, four as moderate, four as slight, and one was not graded. Under the discussion of atrophy of the cortex and leptomeningitis, the relation of edema to changes in the meninges and wasting has been considered. Sub-pial edema is a common condition in patients dying of kidney disease. Reference to the pathological report shows the frequency of kidney involvement in the cases here reported. It is quite possible that the passive congestion so frequently noted is also a factor in the production of edema. That it is not an important factor, is evident from the distribution of the edema. The passive congestion is just as marked in the posterior part of the brain as in the anterior part, and yet the edema in every case except one is localized to this area. The atrophy of the brain is practically always confined to the anterior portion of the parietal lobes, and the distribution of the edema is over this area. It follows that there must be a close etiological relationship between these two conditions.

INTERNAL HYDROCEPHALUS.

Number of brains examined.....	32
Number of cases.....	24

Of the cases of internal hydrocephalus the distention of the ventricles is recorded as marked in five cases, as moderate in nine, and as slight in ten cases. The subject of distention of the ventricles was considered in full in the Second Annual Report. Nothing has been added to our knowledge since that time.

THE CHOROID PLEXUS.

Number of brains examined.....	32
Number of brains showing a diseased condition.....	8

A careful examination of the choroid plexus shows the choroids to be cystic in five cases and presenting tuberculous lesions in four cases. In one case both conditions existed. In only two of these four cases were the tubercles of an appreciable size when examined by the naked eye.

VENOUS THROMBOSIS. VENOUS HEMORRHAGE.

In the First and Second Annual Reports little attention was paid to the vascular system. The question of passive congestion in its relation to headache, gelatinous exudates in the ventricles, etc., was considered. The work for the year 1905 has confirmed the conclusions formerly presented. It is there stated that "there is a close relationship between the venous stasis and the material in the ventricles. The occurrence of a gelatinous material in the choroid plexus in one of the cases studied supports this view. I was at first inclined to consider the gelatinous exudate as an accidental occurrence. The frequency of the condition, together with the changes in the ependymal and subependymal tissues and choroid plexus, and the capillary hemorrhages in the cortex, pons, and medulla, shows a distinct relation between the extreme passive congestion, the distention of the ventricles, and the gelatinous exudate."

In a study of the arterial system, arteriosclerosis was found in four out of one hundred and seventy-six brains. A more interesting condition, however, was that of thrombotic hemorrhage. This condition was present in a slight degree in three cases and in a marked degree in one case. This latter case presents an interesting clinical history and will be considered in connection with some other cases of venous hemorrhage which have a distinct bearing on this subject, although they are not from Phipps Institute material.

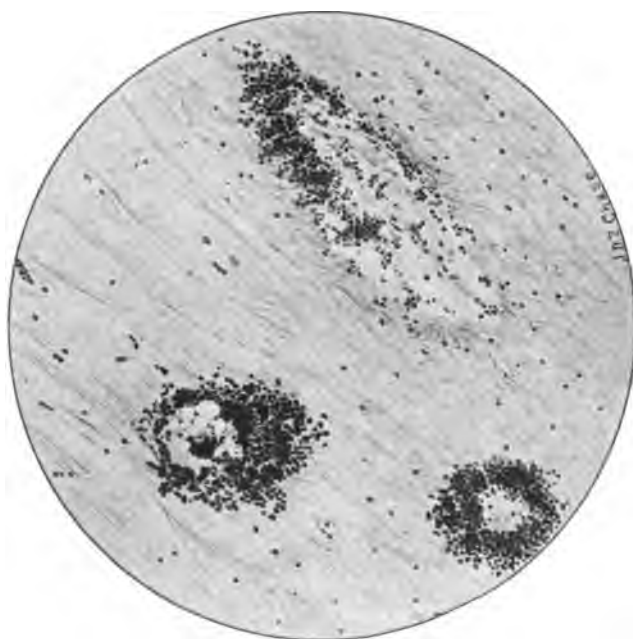
Much work has been done on intracranial circulation, but there are many paralytic conditions that need elucidation. It

should be remembered that the vascular system, veins, and arteries of the whole body are component parts of one system, and that where one of these is at fault, it must naturally react on the other. The arterial system receiving the waves transmitted from the heart is more apt to suffer from accidental conditions of hypertension than is the venous system. We would therefore not expect to see hemorrhage from the veins with the same frequency.

The frequency of arterial hemorrhage and the rarity of venous hemorrhage have led pathologists to neglect the latter subject. I have not been able to find a report of any extensive work on this subject, outside of that done in connection with thrombosis of the larger cerebral sinuses. In the work of previous years the marked grade of passive congestion was noted. This has been looked upon as a result of the dilatation of the heart and the venous stasis as due to the interference with respiration. Long-continued venous stasis might be expected to lead to such a degree of venous hypertension as to result in the rupture of a vein. The elasticity of the walls of the veins, unless there is a marked grade of arteriosclerosis, usually prevents such an accident. In stasis, where the circulation of the vein is slow and a tendency to clotting is present either from sepsis or other conditions, a clot forms in the vessels and a condition similar in its nature to the infarct of other organs results. The back pressure on the feeding veins and the force of the arterial pressure lead to an osmotic hemorrhage. The walls of the smaller veins are distended, permitting a weeping of red blood-corpuscles. The corpuscles are infiltrated between the fixed nervous elements without that degree of destruction and insult that obtains in the sudden rupture of an arterial stem. Not only must we be prepared for a different microscopic picture, but also for a difference in the clinical manifestations. The venous hemorrhages in the tuberculous cases are small and are present, for the most part, without symptoms. In a case of gross cerebral hemorrhage in



Case No. 3560. Area of venous thrombotic hemorrhage in left hemisphere.
Thrombosis of cortical veins in right hemisphere.



Case No. 3560. Microscopic section from area of venous thrombotic hemorrhage seen in accompanying figure. Iron hematoxylin stain.

one of the cortical veins, marked mental symptoms were present. The case is as follows:

Case No. 3560. Age, thirty-two. Admitted into the Institute from the Philadelphia Hospital 7—31—'05; died 9—15—'05. She had had tuberculosis for one year previous to admission. The following symptoms were present from time to time: Cough, dyspnea, hemorrhages, pain in the right chest, and night-sweats. Her best weight had been one hundred and forty-three pounds in November, 1904; her weight on admission was one hundred and three and one-half pounds.

Nervous examination: There was no nervous or mental disease in the family. Her mental attitude was over-hopeful, her memory was poor, and she presented from time to time expansive delusions and also delusions of persecution. The muscular power was preserved and was fair in both upper and lower extremities. All of the reflexes were exaggerated, with the exception of the plantar reflex, which was diminished. The pupils were equal and reacted to light and convergence. There was a coarse intention tremor. The vasomotor tone was good. There were no v. Graefe, Stelwag, or Babinski phenomena. The mental condition presented was one of pseudo-paresis. The patient stated that she always felt fine and was getting along beautifully. She had the idea that she had considerable money, but that the nurses were not safe people to leave it with; also that some one in the house was stealing her clothes, etc.

Autopsy report: Chronic fibroid pleurisy; chronic tuberculosis of the lungs with cavity formation; atheroma of the aorta; fatty liver with miliary tubercles; tuberculous choroids; tuberculous appendicitis; and diffuse nephritis.

Gross examination of the brain: The gross examination of the brain showed a very marked atrophy of the cortex of the frontal and parietal regions. There was a very marked grade of passive congestion. The veins of the convexity were filled with a thick, firm clot, which had evidently formed some time before death. There were two areas of venous hemorrhage. One of these was slight and superficial and was present over the base of the third frontal convolution of the right side; the other was in direct relation with one of the veins. This was an area of infiltrating hemorrhage, 3 by 2 cm., immediately beneath the cortex in the inferior parietal lobe. The infiltration of blood in this area had not destroyed the brain structure, but the blood-corpuscles had saturated the tissue. On microscopic examination the reticular structure was found intact. Areas of punctate hemorrhage surrounded the larger areas.

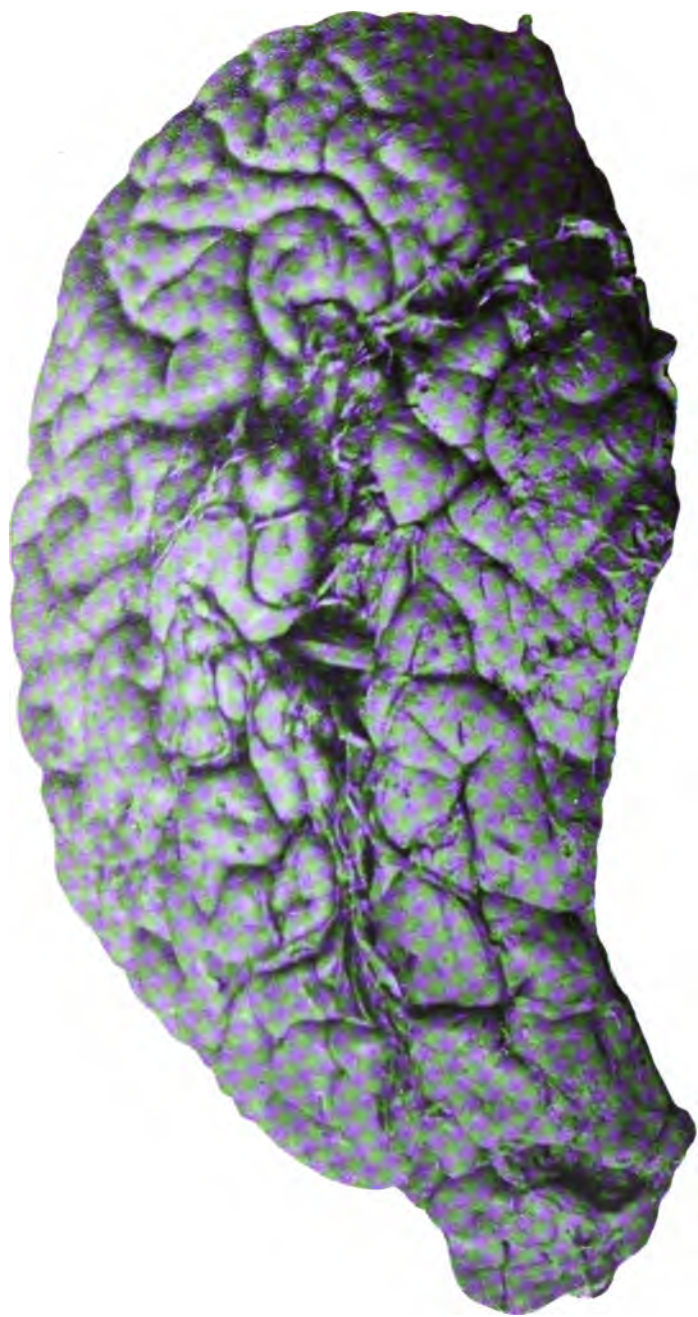
Microscopic examination: The microscopic examination showed infiltrating hemorrhage with some destruction, or rather pressing apart of the cerebral tissues. Surrounding these hemorrhages there was a large number of small, punctate hemorrhages in the neighborhood of the smaller cerebral vessels. These were mainly present in the cortex and subcortex. There was some free blood in the meninges of the cerebellum. The perivascular and pericellular spaces in the neighborhood of the hemorrhagic areas were markedly distended. The spinal cord was normal.

This case is of particular interest on account of the association of a very marked passive congestion with extensive thrombosis, thrombotic venous hemorrhage, and persistent mental disturbance. The hemorrhages could only have been present for a short period before death. The extreme passive congestion and other factors which led to the formation of the thrombi existed for some time previous to this.

A case having a distinct bearing on this subject presenting a true paretic type of mental disturbance is as follows:

G. H. Age, thirty-five. Born in Philadelphia. White. Married. Occupation, stevedore. Admitted to the Insane Department of the Philadelphia Hospital 2—21—'00. His father died of injury to the head at the age of thirty-six; his mother died of cancer of the stomach, at the age of fifty. There were no mental or nervous diseases in near or distant relatives. There were no children.

History taken by Dr. Pickett on 2—21—'00: "Patient takes a glass of beer with his dinner. His general habits and mode of life are steady. The first attack of mental disease was noticed in July, 1898. He had been out of sorts, nervous and emotional, and under a doctor's care since May, 1898. A little later his speech became stammering and uneven, but in July, after working all day and night (overtime), he came home to breakfast and thought it was dinner-time, declaring the clocks were wrong. He was given a sedative, and after sleeping was more composed; but he had done no work since, spending all his time about the house, indulging in harmless imaginings. He imagined that he had money and jewels. The exalted notions disappeared long ago; the tremor became great early in the disease. He has been in bed most of the time for eighteen weeks. He has not been disposed to injure others. He has never attempted suicide. He imagined that the storekeeper on the corner was going to burn the house and kill him. He never



Case G. H. Lateral aspect of brain seen in figure opposite page 119, showing two areas of arterial thrombosis; one affecting the terminal branch of the Sylvian artery, the other an area of softening in a terminal branch of the posterior cerebral artery.



Case G. H. Thrombotic hemorrhage affecting the internal capsule. Gelatinous exudate in the lateral ventricle. Figure opposite page 118 shows a lateral aspect of the same brain with two areas of arterial thrombosis; one affecting the terminal branch of the Sylvian, the other affecting a terminal branch of the posterior cerebral.

cared to leave his wife. There is no theory as to the cause of the disease, unless it is overwork. The patient was always quiet and contented at home. There were maniacal outbreaks (shouting and attempted violence) in June, 1899, and last fall."

Admission paper: The patient has been unable to work for about two years. He has been insane for seven years and eight months. The clinical diagnosis is general paresis.

The patient was good looking and well nourished, but had a childish expression and manifested very great tremor of the facial muscles, tongue, and extremities, both spontaneous and volitional. The speech corresponded with these symptoms, being extremely paretic, even ataxic, at times inhibited by the unruliness of the muscles. There were no manifest delusions. 9-1-'00: "Patient has been quite ill for two weeks, temperature varying from 99° to 100°. The muscles of the hand are constantly twitching. He holds his mouth rigid so that the tongue cannot be seen. He will not speak. 9-2-'00: Yesterday pulse became more rapid. There were signs of consolidation noted over the base of the left lung. Patient died this morning."

Gross examination: The gross examination shows a rather marked grade of atrophy over the frontal and parietal areas and very marked passive congestion. There is an area of arterial thrombotic softening embracing the posterior branch of the Sylvian artery of the right side, producing an area of softening in the posterior third of the inferior frontal convolution and the inferior third of the ascending frontal convolution. There is also an area of arterial thrombotic softening in the main terminal branch of the Sylvian artery of the right side. This affects the superior temporosphenoidal convolution and also the inferior portion of the supramarginal and angular gyri. There is a small area of arterial thrombotic softening in the distribution of the posterior cerebral artery of the right side affecting the superior occipital gyrus. On section of the brain the right lateral ventricle was markedly distended. In the left hemisphere there is an area of venous thrombotic hemorrhage, 2 by 4 cm. in diameter, affecting the distribution of the lenticular nucleus. The left lateral ventricle is filled with a gelatinous mass and also contains some bloody fluid. There is a very marked grade of cerebral arteriosclerosis, in both the circle of Willis and the cortical vessels. The microscopic examination reveals the same condition as that described in the first case.

Another case from the Philadelphia General Hospital, which has a distinct bearing upon the subject of thrombotic hemorrhage, and illustrates from both a clinical and pathological standpoint

how an infiltrating type of hemorrhage differs from the frank arterial rupture, is as follows:

J. B. White. Admitted to the hospital 7-12-'06; died 7-25-'06. The chief filing diagnosis was pontine hemorrhage, complicated by arteriosclerosis and chronic interstitial nephritis.

Autopsy report on the viscera, 7-28-'06: Primary carcinoma of the left kidney; secondary carcinoma of the right kidney, lungs, heart, spleen, peribronchial and gastric glands; secondary carcinoma of dura, brain, and lumbar vertebrae; chronic interstitial nephritis, brown atrophy of heart; chronic adhesive pleurisy of right side; fatty cirrhosis of liver; and fatty atheromatous arteritis.

The patient's history was not obtainable on account of his condition. He was a thin, spare man, apparently sixty-five years of age, with a good crop of hair, mostly gray. He seems to understand the few simple questions put to him; but he is unable to answer them because of speech impediment (?). He denies pain. The left side of the face is paralyzed. He is unable to wrinkle his forehead or shut the left eye. The facial folds are less marked. He cannot protrude his tongue. He is unable to move his tongue from side to side. He cannot move it beyond the median line toward the right. The tongue is dry and brown. He does not object to pin-pricks made on any portion of the face except when touching around the eyelids. The jaw jerk is not increased. The left pupil is slightly larger than the right. Both pupils react promptly to light and accommodation. There is considerable lachrymation. The ocular movements cannot be tested on account of the mental condition of the patient. The chest is emphysematous and hairy. The muscles are considerably emaciated. There is hyperresonance. The breathing is somewhat rough and stertorous, more marked on the right side. The heart sounds are weak and rapid; no murmurs can be heard. There is marked arteriosclerosis. The movements of the right arm are not so easily performed as those of the left. The musculature is fair. At about the insertion of the deltoid of the right arm there is a hard smooth tumor about the size of a walnut; it is movable in all directions. Both arms are equally warm. He responds to pin-pricks slightly on both hands; less so on the arms. All the reflexes are increased; the left more so than the right. The abdomen is distended in the lower quadrant. Movements of the lower extremities are performed with difficulty. The left are weaker than the right. The right foot is held up better than the left as the man lies in bed. The knee jerks are increased on both sides, but more so on the left. Achilles jerk is marked

on both sides. Babinski reflex is present on both sides; the plantar skin is very sensitive.

Sensation: Patient evinces no pain, but indicates touch by a shake of the head.

7-14-'06: Patient is brighter, answers to commands more promptly. There is some spasticity of the right arm and leg. He has no difficulty in digestion. He can speak a little this morning. The lids can be closed better than yesterday. The left pupil is a little smaller than the right. Patient is incoherent.

7-16-'06: There is a very marked arteriosclerosis including the vessels of the lower extremities. Patient is conscious and responds to commands. Attempts at speech result in muffled murmur. He is able to lift both arms, the right in a jerky manner. He has voluntary control over both legs. The left foot is held in extension, simulating club-foot. The patient, by preference, uses the left hand and arm. He can make a grip with the right hand, but it is much weaker than the left. The right arm is rigid, the left arm has a tendency that way. Neither leg is rigid. Right knee jerk is quick. There is a crossed reflex on the right side. On the right side there is extension of the great toe and flexion of the small toes. There is extension of all toes on the left side. Cremasteric reflex is present on the right side, but not on the left. There is a marked Gordon reflex on the right, but none on the left. Repeated Gordon reflex on the right produces extension, and then flexion, probably voluntary. The biceps and triceps jerks are quick. The tongue protrudes in the median line, but cannot move to the right. There is almost complete ptosis at rest, on both sides. When told to open the eyes, he opens the right about one-half and the left one-third. The nasolabial line on the left side is obliterated.

Pupils: Both pupils react promptly to light. The examination of the ocular muscles is unsatisfactory. On both sides he appears to react slightly to pin-prick. His breathing is stertorous to-day.

7-19-'06: Eye examination by Dr. Griskey: The fundus is redder than the anæmia of the patient would warrant. The eye-grounds are normal. The vessels are engorged. There is a corneal ulcer.

Urine, 7-14-'06, red in color, alkaline, sp. gr. 1023; microscopically red blood-cells, epithelial cells, phosphates, and urates.

Gross examination: There is no atrophy of the cortex. There is moderate edema over the prefrontal lobe of the left side. There is moderate passive congestion, but no basal roughening on the inferior surface of the brain. The choroids appear to be normal and there is no distention of the ventricle. There are multiple areas of carcinoma of both the cerebrum and cerebellum.

On the left side there is one area 1 cm. in diameter at the base of the third temporosphenoidal gyrus; one, 0.5 cm. in diameter, at the base of the gyrus occipito-temporalis; a smaller one, 3 mm. in diameter, in the posterior portion of the same gyrus; another area, 1 cm. in diameter, on the third occipital gyrus on the external surface of the brain. There is an area of 7 mm. to 8 mm. in diameter in the middle of the second frontal convolution, and a small area immediately beneath the cortex, 2 mm. in diameter, in the posterior frontal convolution. There is one area, 2 mm. in diameter, at the superior edge of Broca's convolution. A number of white pin-point areas are scattered over the pia-arachnoid of the prefrontal and motor areas. These may be areas of chronic leptomenigitis. In the right hemisphere there is an area in the gyrus occipito-temporalis lateralis, one and one-half inches from the posterior portion of the brain. This is between the junction of the temporal and occipital lobes of the brain at the junction of the inferior and exterior surface. There is a small area, 0.5 cm. in diameter, at the occipital pole of the brain, an area 3 mm. in diameter at the posterior part of the third temporosphenoidal gyrus. All of the areas are pigmented black. There is another area, 8 mm. in diameter, in the middle portion of the temporosphenoidal lobe, a small subcortical area, 2 cm. in diameter, in the posterior portion of the middle or second temporosphenoidal gyrus, and a small sub-pial area, 3 mm., in the posterior portion of the second frontal convolution. On the inferior surface of the right hemisphere there is an area 5 mm. in the posterior portion of the occipito-temporalis medialis. There is a moderate to advanced grade of arteriosclerosis in the circle of Willis.

Cerebellum: There are no tumor masses in the cerebello-pontine angle. There are three areas on the superior surface of the right lobe of the cerebellum, one 3 mm., one 5 mm., and one 5 cm. in diameter. On section of the pons there is an area 7 mm. in diameter, in the middle of the left half, 2 mm. below the median fillet, and pressing it upward. Immediately beneath the cortex of the left cerebellum there is an area 3 mm. in diameter. This area extends from the level of the posterior portion of the fourth nucleus backward to the level of the fifth nucleus. From this level there is a large area of what appears to be a thrombotic hemorrhage, occupying the upper half of the pons on the left side and affecting the motor tract on the inferior surface. This extends posteriorly throughout the entire pons and then extends in a dorsal direction into the lateral lobe of the cerebellum. It does not involve the medulla. On mesial section of the brain, an area 2 cm. in diameter, immediately beneath the ependyma of the anterior horn of the right lateral ventricle, is present. On cross-section of the left hemisphere of the brain, no areas were found. There is a marked brownish pigmentation in the medulla.



Case J. B., pages 120-122. Infiltrating hemorrhage of the pons and cerebellum.

A careful study of the history of this case will show the presence at one time of marked paralytic symptoms, upon which the diagnosis of pontine lesions was made. These symptoms disappeared after a few days and demonstrate what I have contended for a long time, that the infiltrating types of hemorrhage are not necessarily destructive of the function of the part in which they occur.

My attention was first directed to the infiltrating type of hemorrhage complicating venous and thrombotic hemorrhage in a case of extensive thrombosis formation of the lateral sinus, the straight sinus, and the veins of Galen, together with thrombosis of the superior veins of the cerebellum. All the cerebral tissues in the distribution of these veins were completely saturated with red blood-corpuscles. The importance of venous and arterial thrombosis in a study of the pathology of the brain in pulmonary tuberculosis cannot be overestimated. The uniformly low blood-pressure of well-developed cases of pulmonary tuberculosis makes the diagnosis of cerebral arterial hemorrhage improbable. In cases of hemiplegia with active onset the diagnosis is always in favor of arterial thrombosis.

CLINICAL MANIFESTATIONS.

During the present year we have made record of the nervous manifestations in tuberculosis in one hundred and seventy-six cases; of these, sixty-five were house cases and one hundred and eleven were dispensary cases. The examination of the dispensary cases was made by Dr. Carncross.

HISTORY OF NERVOUS DISEASES IN THE FAMILY.

A history of nervous diseases in the family.....	<table><tr><td>Was present,.....</td><td>16</td></tr><tr><td>Was not present,.....</td><td>147</td></tr><tr><td>No record,.....</td><td>13</td></tr></table>	Was present,.....	16	Was not present,.....	147	No record,.....	13	176
Was present,.....	16							
Was not present,.....	147							
No record,.....	13							

A study of the nervous diseases in the immediate ancestry gave the following results: Nervous prostration was present five

times, nervous headaches (migraine) twice, hysteria once, chorea three times, epilepsy once, and paralysis once. In the collateral branch of the family, nervous prostration was present in one case in a cousin, and chorea in a cousin. In one case both epilepsy and nervous prostration were present in the mother, and in two cases infantile convulsions were present in the progeny. The presence of nervous prostration in the ancestry is interesting on account of the frequency with which early tuberculosis is mistaken for neurasthenia. It is quite possible that some of these cases of nervous prostration in the parents were manifestations of tuberculosis.

HISTORY OF INSANITY IN THE FAMILY.

History of insanity in the family.....	{	Was present in,.....	14	}	176
		Was not present in,.....	154		
		Was not recorded in,....	8		

The relatively large percentage of cases giving a family history of insanity has, I think, a double bearing.

(A) As showing a predisposition to a disturbance of the mental equilibrium by stress or strain, or through the influences of toxic processes, or as a result of general lowered nutrition.

(B) Transmission to the child of a weakened nervous system. The predisposition to mental disturbance in those showing a vicious family history, of insanity, epilepsy, grave hysteria, drug habits, etc., is well acknowledged by alienists. It is considered that both physical and mental attributes of the parents have a tendency to reappear in the progeny. If closely studied, the parental characteristics will reappear in the child, unless counteracted by some stronger influence. Other things being equal, the paternal transmission is much stronger than the maternal. Where, however, the deficiency of the progeny is present in both parents, it is not only seen more accurately and constantly reproduced in the child, but is likely to be accentuated. It is in this way that consanguinity is likely to cause to be transmitted to the

progeny those mental characteristics which are more likely to be identical in members of the same family. Nature wisely, in normal people, corrects the tendency by mating away from the family stock. Where marriages take place within a family by near relatives, a deviate type of mind is very often present and accounts for the circumstance. It will be seen, therefore, in the progeny of such marriages, that the mental and nervous characteristics which are not desirable are more likely to be transmitted and accentuated. While acquired physical characteristics or deficiencies are not transmitted in the same degree as the mental and nervous, and while the evidence at the present time is very deficient in this regard, a consideration of the subject should have some influence in deciding as to the advisability of a marriage between two tuberculous patients with extensive disease of the lungs.

The influence of insanity in the parentage has another bearing. Deviations from the normal or the average physical type (popularized by Lombroso and Nordau as "stigmata of degeneration") occur in larger numbers and with much more frequency in the progeny of the insane than of normal people. A study of the chest of a large number of tuberculous cases will reveal certain deviations and deficiencies which have led me to the opinion that a certain, even if small, class of tuberculous patients is pre-disposed to the lung infection from an inherited and deficient nervous innervation to pulmonary and other structures which lowers their resistance to infectious processes. In a study of fifteen cases of hemiplegia at the Philadelphia General Hospital, dying from pneumonic processes, I have found that in every case the pneumonia is present on the paralytic side. This cannot be explained by deficient expansion; we must therefore fall back upon some deficiency of nervous innervation. The small group of tuberculous cases above referred to are those which show asymmetry of two sides of the chest, one side being relatively infantile; cases in which the entire chest is infantile and distinctly

out of proportion to the physical development of the rest of the body; cases showing complete or partial absence of the spinous process or laminae of the cervical or dorsal vertebræ; cases showing synchondrosis of the ribs, or supernumerary ribs. The influence of variations in the shape and the size of the upper air-passages upon the development of pulmonary affections has not been studied out. Dr. Flick has called my attention to the influence of tuberculosis in early life in the production of some of the deformities above noted. Tuberculosis of the lymphatic system would interfere with nutrition and lead to a deficient physical structure, and tuberculosis of the lungs to chest deformities. I have not in the above discussion taken into consideration those deformities of the chest—rickets, etc.—which have been accepted as due to the disturbance of the respiratory function, in early life. While it is quite possible that a small chest and otherwise large body might be due to some disease of the lungs or the mediastinum, in early life, there is as yet nothing to prove such a contention. In the case of unilateral infantile chest, disease of the lung on the affected side is a possible, but to me a not very probable factor. This does not refer to cases of empyema, hydrothorax, etc. It is most often seen in cases of a minor grade of cerebral palsy in childhood. There are cases in which this cannot be demonstrated and which at the same time present no evidence of previous lung involvement. This does not mean, of course, that such an involvement could not occur. Complete or partial absence of the spinal processes, deficient laminae of the vertebræ, synchondrosis of the ribs, supernumerary ribs, etc., must be accepted as congenital deficiencies.

Whether the long, so-called phthisinoid chest which has been considered as especially favoring the development of pulmonary tuberculosis is an acquired condition due to tuberculosis in early life, or whether, on the other hand, it is a congenital condition due to an inherited or acquired lack of muscular tone, is still undecided. I am convinced that a study of patients along the

above lines will give us some valuable information for diagnosis, prognosis, and treatment.

Another relation of insanity to tuberculosis is the presence of a history of tuberculosis in the ancestry. Statistics on idiocy and imbecility, for example, show that a tuberculous or scrofulous history has predominated in from 15% to 20%.* These statistics led to an examination of all the cases of idiocy and imbecility dying at the Philadelphia General Hospital since 1895. There were, in all, fifty-five cases. Of these, phthisis pulmonalis was given as the cause of death in twenty-seven cases, generalized tuberculosis in two, and pneumonia in three cases. There were thirty females and twenty-five males. Of the females, eleven died of pulmonary tuberculosis, one of generalized tuberculosis, one of phthisis florida, and two of pneumonia. Of the males, fourteen died of pulmonary tuberculosis, one of generalized tuberculosis, and one of pneumonia. These statistics, taken in conjunction with those of Eskridge, above mentioned, have, I think, an important significance. They indicate the influence of tuberculosis in the parents upon the development of deficient mental conditions in the child. These statistics of tuberculosis as the cause of death in idiocy and imbecility (52.7% in my collection of cases) are so much higher than in any other chronic organic disease as to indicate a very close relation between the tuberculous and the deficient mental states. It should be borne in mind that these statistics are taken from a hospital where only the very advanced grades of imbecility are taken. If the minor grades of mental deficiency could be studied in the same way, some important statistics in reference to mental aberration and criminal tendencies might be secured. Kleptomania, pyromania, etc., as found among the insane, are nearly always found among the higher grade imbeciles and idiots. Tuberculosis as a cause of death, by itself, would not have the same significance as when

*J. T. Eskridge: "Text-Book of Legal Medicine and Toxicology," by Peterson and Haines, vol. i.

taken in conjunction with a history of tuberculosis in the ancestry. Langdon Doun found a marked history of phthisis in 25% of the fathers and 20% of the mothers of idiot and imbecile children.* Grabham found a history of phthisis in the parents or relatives in 22% of two hundred and forty-nine cases. Kerlin gives consumption as the possible factor in fifty-six cases he has examined. Piper found phthisis in the parents and near relatives in 23%. Barr states that: "The immediate effect of phthisis upon the stongest constitution is a lowering of tone and a lessening of all the physical forces; but in enfeebled constitutions it coöperates readily with any neuroses, patent or latent, in the work of disintegration and tearing down of tissue, nerve, and fiber, inducing an enfeebled condition utterly unsuited to healthful procreation. It is this general poverty of the whole being which chiefly characterizes the victims of a phthisical heredity, and what is more to be dreaded than the inheritance of the actual disease, in so much that such a condition is favorable to the development of idiocy either congenital or accidental." This, however, does not state the entire truth of this matter as evidenced by the statistics in connection with the subject of cancer and idiocy. Doun, for instance, found cancer in 3% of the fathers and 5% of the mothers, and considered it a factor of only minor importance. The other etiological factors in imbecility are as follows: Paternal intemperance, 9% to 16%; inherited syphilis, 1% to 2%; and consanguinity of the parents and grandparents, 5%. Barr again states: "The various data with which we have been occupied have been gathered from the records of no less than 15,745 cases, the result of years of study and research of men engaged in the work. In reviewing, comparing, and summing up, a consensus becomes evident regarding the production of each or any of the causes cited of a malnutritive condition tending so to prevent, to arrest, or to retard development, physical, mental, or moral, as to result in idiocy or imbecility. By all the

* Barr's book on "Mental Defectives."

hereditary causes, whether acting singly or in combination, are found to be most pronounced, and these again are distinctly accentuated in the condition of mothers during gestation, and in the heredities of imbecility and of phthisis. Furthermore, the influence of some congenital cause is frequently traceable in many of the accidental and developmental causes attributed."

It is unfortunate that statistics are not at hand in other forms of insanity. The material in this one particular form, however, opens up a wide field of investigation. In subsequent reports this matter will be again taken up as to other forms of insanity.

It will be seen that syphilis in the parents, which is considered to be the most potent factor as to the causation of defective mental states in the child, is present in only 2% of the cases, whereas a tuberculous or scrofulous history is present in 15% to 20%. Syphilis of the nervous system is given as the cause of death in only one case of the fifty-five analyzed above, with a possible second case in which the cause of death is given as a chronic meningitis with acute mania.

MENTAL ATTITUDE.

Number of patients, 176,...	Whose mental attitude was	Before onset of tuberculosis, ..	Cheerful,.....114 Pessimistic and irritable,..... 16 No record,*..... 46	176
		After onset of tuberculosis,....	Cheerful,..... 27 Pessimistic and irritable,.....105 No record,..... 44	176
			Hopeful,.....134 Not hopeful,.... 18 Over hopeful,... 2 No record,..... 22	176
	Who showed evidence of being .	Depressed,.....	98	176
		Not depressed,.....	54	
		No record,.....	24	
		Suspicious,.....	13	176
		Not suspicious,.....	127	
		No record,.....	36	

* This lack of record in the forty-six cases was partly due to the inability of these patients to give a definite account of their mental attitude in health.

After the full discussion of the mental attitude in the First and Second Annual Reports, it is quite unnecessary in this report to go into an analysis of this condition. We shall simply add in the present volume the statistics for the year and any new observations to support or modify the statements of the previous work in this field. The statistics have been placed close together because a close study and comparison gives a possible explanation of the development of abnormal mental states in infectious diseases, and more particularly in this connection in the subject of pulmonary tuberculosis and its complicating infections. The analysis of these statistics will show a large percentage of cases in which the memory has become deficient since the onset of tuberculosis (*vide infra*). When to this is added the suspicious mental attitude in thirteen cases, mental depression in ninety-eight cases, a change to irritable and pessimistic mental attitude in one hundred and five cases, and the history of insanity in the family in fourteen cases, the influence of this disease upon the development of abnormal mental states becomes evident.

Mental Depression.—Mental depression is due to so many causes that it cannot be considered as a special characteristic of tuberculosis. Patients ill with almost any other chronic disease might be expected to show an equal percentage of cases exhibiting this symptom. The presence, however, of 55% of cases, when considered with the loss of memory, suspicion, etc., assumes an entirely different significance.

Suspicion.—A suspicious mental attitude is a common condition in many forms of insanity. The suspicious mental attitude of tuberculosis, without other evidence of insanity, occurs very often in early and in cured cases. Delusions of persecution often arise as an overdevelopment of this suspicious mental attitude. It is more likely that the suspicion which has been noted by Clouston, and fully discussed by Carncross in the Second Annual Report, is the result of pre-existing tuberculosis. Clouston considers the relation of tuberculosis to suspicion as a mental

symptom. He states, in discussing the origin of monomania, "that most of the remainder, comprising over one-third of the cases, seem to me to arise either out of perverted organic sensations caused by constitutional diseases characterized by lack of trophic power and brain anæmia, notably tuberculosis. Any man with an anæmic, ill-nourished brain is apt to be morbidly suspicious." I do not, however, agree with his conclusions that the suspicion, at least in all cases, is due to a lack of trophic power and brain anæmia. As stated above, this symptom, as seen in tuberculosis, is present in early and healed cases where the blood picture and the vascular supply to the brain are not seriously interfered with. It is difficult, however, to decide definitely to what this suspicion should be attributed. That it is an important factor in the development of abnormal mental states, there is no question in my own mind.

SLEEP.

Number of patients who slept.....	Well,.....	95	} 176
	Fairly well,.....	20	
	Poorly,.....	47	
	No record,.....	14	

Loss of sleep is an important factor in the production of mental and nervous exhaustion. In a large percentage of patients whose sleep is markedly disturbed, there is only a small percentage whose inability to sleep is due to pain or coughing. It is a common observation that insomnia is present without any apparent cause. This is more often seen in the advanced cases, and may be produced by a lack of blood-supply to the brain, or be due to the effect of stimulating toxins. The matter needs more careful study before any conclusions can be drawn.

DREAMS.

Number of patients who.....	{	Dreamt continually,.....123	} 176
		Did not dream,.....35	
		No record,.....18	

Dream states are common in people in apparently normal and vigorous health. They are considered as manifestations of the activity of the subconscious brain during sleep. A pathological condition of the various viscera not only accentuates the frequency, but also the intensity of dreams. This has been considered especially true of the liver, the gastro-intestinal tract, and the heart. In cardiac disease it may be due either to disturbance of metabolism of the body as a result of the interference with the circulation of blood to the various viscera, or to a deficient supply of blood to the brain, with a disturbance of its function. In pulmonary conditions, more especially tuberculosis, the interference with the function of the heart becomes a factor in dream production. The impoverished blood states in tuberculosis, the intoxications from the tubercle bacilli and the organisms of mixed infections, may also play a distinct part. In border-line mental states delusions sometimes arise as a result of active dream states, or, rather, the type of delusion is framed from the mental pictures of dreams. A case of paranoia under my observation for many years, at the Philadelphia General Hospital, presents delusions upon which were based various homicidal attempts. These delusions resulted from a dream state accepted by the patient as a communication from heaven. Tuberculous patients frequently present the mental condition in which the personalities of a dream are present as a hallucination, for a short period after awakening. After suddenly awakening from a dream state, they will see at their bedside some friend or relative about whom they have been dreaming. Dreams of dead relatives are very commonly noted in taking our histories. Hallucinations and delusions concerning the return of dead relatives are likewise frequently noted under "disturbance of the mentality." Until statistics of the percentage of normal people who present the various types of dream states are compiled, it will be impossible to draw conclusions from the statistics of dream states in tuberculosis.

MEMORY.

Number of patients whose memory was.....	$\left\{ \begin{array}{l} \text{Good,.....}95 \\ \text{Fair,.....}32 \\ \text{Poor,.....}33 \\ \text{No record,.....}16 \end{array} \right\}$	176
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Accurate statistics on memory are naturally very difficult to obtain. The determination of the relative grades of deficient memory is a psychological problem which should be worked out with definite tests. The most that we have been able to do in compiling these statistics is to use more or less gross tests and depend to a certain extent upon the patient's statement that there is a decided or relative deficiency of memory. It has been found, in making careful tests in a small number of cases, that the patient is likely to err on the side that he still has a good memory, when there is an actual loss of memory, rather than to state that there is a loss of memory when the memory is retained. Apart from distinct delusions, loss of memory is an important factor in the development of mental disturbance; this is more particularly true of confusional types of insanity. Consciousness and normal mental states depend upon a continuance of mental impressions, or rather mental actions, depending more or less upon each other. When this association is disturbed, a confused mental condition results. This is not the only factor that leads to mental confusion, but, as seen in tuberculosis, is probably the most important factor.

DELUSIONS.

Number of patients in whom delusions were.....	$\left\{ \begin{array}{l} \text{Present,.....}27 \\ \text{Not present,.....}138 \\ \text{No record,.....}11 \end{array} \right\}$	176
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Delusions were present in twenty-seven cases out of one hundred and sixty-five recorded cases. These delusions were very often of a simple nature; *i. e.*, they were based on hallucinations of sight for the most part. Most common were delusions

concerning dead relatives and friends. These reappeared and often talked with the patients. Seven out of twenty-seven cases were of this type. Six were cases having delusions of persecution. One of these was a well-developed case of paranoia, and assaulted a visitor to the wards, upon whom his delusions were centered. He also made a threat of killing this same person. It appears that in all these cases suspicion was a confirmed and dominating symptom.

In all the cases except where the delusions were well systematized, as in the case of paranoia, they were associated with confusion, and varied in their type from time to time. Three cases presenting the mental type of pseudo-paresis were described in the Second Annual Report. In this group the analysis of the mental attitude, associated with the analysis of all cases showing decided mental disturbance, gave a fairly clear idea of the development of the mental states from the simpler elements studied under the heading of "mental attitude." From a state of marked loss of memory associated with hyper-suspicion and general lowering of the mental vigor as a result of general lowered physical tone, loss of sleep, and worry, to a condition of mental confusion with hallucinations and delusions of sight, hearing, persecution, etc., is not a very marked step. The border-line between cases in which there is a marked suspicion toward all those in contact with the patient and cases of distinct delusions of persecution, is not at all well defined. Cases of the former at times appear to have distinct ideas of persecution, and at other times have a distinct realization of their relations to other people. The same may be said as to cases of marked loss of memory, nervous exhaustion, and cases of well-defined confusion. Other hallucinations and grandiose states are likewise very closely associated. The development of the latter from the former can be followed while the patient is under observation.

Eskridge states: "It is rare for insanity to develop as a result of tuberculosis of the lungs until the latter has become well ad-

vanced, and then, in the absence of a tuberculous condition of the cerebral membranes, it is probable that the mental derangement is due to the general adynamic state of the system and the impoverished blood state, rather than to the presence of tubercles in the lungs. The development of insanity, most commonly melancholia, in pulmonary tuberculosis usually indicates a bad prognosis, as the mental derangement is commonly not recovered from. Fortunately, in these cases, life is not greatly prolonged. A chronic tuberculous condition of the cerebral membranes in adults, especially in Colorado, is not infrequent, and a condition of mental and physical depression, amounting in many instances to insanity (melancholia), may precede death by several months. In many of these cases no evidence of meningitis is apparent until a few days or a week or two before death, although the autopsy reveals pathologic changes in the cerebral membranes that must have existed for several months. From a study of a large number of tuberculous subjects, both sane and insane, it does not seem to me that the term phthisical insanity is justified."

A careful review of the work at the Phipps Institute for the last three years, where particular attention has been paid to the mental condition of patients, leads us to disagree entirely with the above statements. We have not found at all that melancholia is a common type of mental disturbance complicating pulmonary tuberculosis. We have not seen a single case of this type of insanity either at the Henry Phipps Institute, or White Haven, or in the tuberculous wards of the Philadelphia General Hospital. The statement that it is rare for insanity to develop until the tuberculosis has become advanced, is not at all in keeping with our own observations. Cases of insanity are not infrequently seen complicating relatively early cases of tuberculosis while the patient is in fair condition. The most common type of mental disturbance is a confusional condition associated with delusions. I think that the mental condition in these cases is fairly characteristic. The changing type of delusions, from time

to time, associated with failure of memory and some confusion and suspicion, are the diagnostic symptoms.

The smaller group of cases described in the Second Annual Report as tuberculous pseudo-paresis, seen only, as far as I know, in tuberculosis, is a distinct and characteristic form of mental disease. It occurs in advanced cases of pulmonary tuberculosis in which there is evidence of marked toxemia. Expansive ideas with delusions of grandeur and a feeling of well-being in marked contrast to the physical condition, childishness, marked tremor, exaggerated reflexes, and disturbance of speech present a clinical picture sufficiently resembling that seen in general paralysis of the insane to be striking. Here, again, there is no difficulty in recognizing a certain distinct difference both in the development and in the clinical picture itself. The mental manifestations are probably an overdevelopment of a certain hopeful mental attitude frequently seen; the tremulous parietic type of speech, an accentuation of the tuberculous tremor associated with loss of memory and of muscular vigor; the childishness and deterioration of mental tone, an advanced stage of loss of memory seen at times in early and frequently in advanced cases. The following ward notes of the mental condition of some of the patients above described will give some idea of the types of mental disturbance.

Case No. 3143. Patient is a paranoiac with systematized delusions of persecutions. While in the House of Rest, in New York, he thought poison was being placed in his food by some one. He had a delusion that the superintendent was prejudiced against him, and that he poisoned his food and had him unjustly sent to the Manhattan State Insane Asylum. He attempted to assault and threatened to kill the superintendent, on a visit to the Institute.

Case No. 1163. Patient had systematized delusions of persecution with hallucinations of hearing.

Case No. 2019. Patient imagines certain people are saying things, but never caught them. He calls out a great deal in his sleep. This is a borderline case, where the suspicious mental attitude has resulted in a loss of his relation to his fellow-beings.

Case No. 3150. At times, the patient heard the voice of his father, who is dead. (Simple hallucinations of hearing.)

Case No. 3235. Patient at times sees people dressed in white. (Hallucinations of sight.)

Case No. 3237. Patient has often seen and talked with dead friends.

Case No. 3249. Patient had a delusion that his dead grandfather came back and wrote on the wall with a straw.

Case No. 3261. Patient had a delusion that his dead father talked with him; he often sees queer things (pictures, etc.) when he is awake.

Case No. 3300. Patient at times sees her dead friends.

Case No. 3339. Patient has delusions of persecution; he thinks he hears people saying he is an ass and all sorts of disagreeable things.

Case No. 3425. Patient had a delusion that two colored men were trying to kill him.

Case No. 3521. July 17th: Patient talks nearly all night and day, but cannot be understood. He is calling some one all the time. He also saw four men going up a flag-pole outside the window, and states that the man turned around and put out his arms. He told one patient where he lodged, and that he had to pay ten cents a night, which he says is very expensive. Last night he called a boy and told him that he wanted a drink of water. The patient rang for the nurse to get it for him, but he told the nurse he did not want it. A few minutes after that, a patient walked past his bed; he asked this patient for a drink and did not seem to know that he had asked for it before. He thinks he is drinking too much milk; that it causes a rash to come out all over his face. He says he will have to stop taking it. A patient was talking about a fellow workman not being confirmed or going to church. He said, "What is the difference? When you die, you die." Patient says some one is crying "Murder" now. He is continually talking to himself. July 19th: Patient insists on going home. He says his people are paying five dollars per week board, and he does not intend to sleep in a stable. He tried to get at two bottles of beer which were on the other side of the room. He said a child was down the cellar calling to her father, upstairs, that some of the beer was sour. At dinner-time the patient pulled the tray off of the table. He claims it was sliding off and he wanted to catch it. He claims he is in a barber-shop getting money from some one. This case presents the changing type of delusion, with confusion, loss of memory, etc., above noted.

Case No. 3560. September 1st: Patient is confused a greater part of the time. She is continually talking about money. She claims she had twenty-five dollars, which a nurse stole from her. She begs to be allowed to go to see an aunt who lives near. She says one of the other patients will

go with her. September 14th: Patient is confused; she says she cannot find her shoes. She told the nurse she was out during the night and bought a pair of ties and dancing pumps to wear when she goes out. She says she went through her husband's trousers pocket and found fourteen dollars, but lost it. September 5th: She imagines she sees men and boys in the ward. She says she knows the doctor is going to perform an operation on her, and that she is going to run away in order to prevent it. September 8th: Patient told the doctor that she was out last night and had a good time at her aunt's house. She says she has a brother who steals all the money he sees. She talks about money all the time.

Case No. 975. Patient was very restless in the early part of the afternoon. He has also coughed a great deal. He had difficulty in raising sputum and started to swear. He said he would sit up all night. He was persuaded to remain quiet and did so until nine in the evening, when he became very noisy. He talked out loud and asked the nurse what the three bottles were doing on his table, if she was going to hit him with them. He said that she had caught him asleep and that she would have to pay dearly for it. He wondered what so many men were doing in front of the building, talking. He cursed them and told them to go to ———. She told the patient she would send them away. He said he was glad. He rested quietly after that and slept until 1 A. M. He was then restless till morning. He ate a slice of bread and butter and two cups of milk at 6 A. M. 12—20—'05: Patient refused to take tablet of nitroglycerin and strychnin sulphate. The nurse administered them dissolved in water. He said after taking it that she had given him the same medicine in a different form. He also said he felt worse and that she must have given him an extra dose. 12—22—'05: Patient asked the nurse, "What is the difference between a rainy day and a lamp-post?" The nurse said she did not know. Patient answered, "A string." 12—25—'05: Patient said he knew of a man that sang a song at half-past ten mass on Sunday, called, "Everybody Works about the House but my Old Man." He also said she should not mind anything he said to her, for he was "buggy." 12—28—'05: While the nurse was making patient's bed this morning, and changing his shirt, he got very much excited. He said he saw his finish; that she was going to butcher him. She told him that she was not quite that bad, and he replied that there were no cobwebs on his brain and that he had just as much sense as she had. 12—30—'05: While giving patient bath, this morning, he was very cross and impatient. He said that the nurse gave him a h—— of a punch. He wants to see his sister so that she can get a cab to take him home. He says we are not treating him right. He thinks that a man dying, like he is, ought to have a nurse with him all the time, and if the



Neurological laboratory.

nurse has not the time to stay with him, he ought to have a man sit with him. 1-1-'06: He claims he is in the surgical ward, and states that he is too weak to be cut up. He is continually talking of going home. 1-2-'06: Patient wishes he could get half a cigarette. He wanted one of the patients to get it for him. He also wanted one of the patients to write a letter to his father to come and take him home. 1-3-'06: Patient called the nurse to him, and when she came he said, "What is wrong with you? I was calling my friend Pat." He said Pat was going to take him home. Again he called the nurse, and when she went to him, he told her he thought she was a curiosity-seeker.

Case No. 3457. Imagines people look in at windows at her.

Case No. 3290. Patient thinks she is a spiritualistic medium, and really believes in it. This case presents a complete change in the type of mental disturbance from time to time.

Case No. 3638. Years ago patient had a "kind of delusion" that he was in hard luck and prayed to the Lord to receive help, and in the night a voice told him to pray and do better. This was a real voice, but did not sound natural. Patient thinks he was awake, and there was no one in the house except himself. He thinks it was a voice direct from heaven.

Case No. 3138. Patient has visions at times.

Case No. 2676. Patient is usually quiet, but became noisy and swore, using very profane language. He declared he intended to marry the night nurse just as soon as he could get around. He also stated he never had consumption. This patient also had delusions of persecution.

Case No. 3499. Patient was somewhat flighty. He asked the nurse if the milk was diseased and refused to drink it. He wanted to know why he was in the hospital.

Case No. 2481. Patient presented delusions of persecution and suspicion. He called and asked if I had thrown a remark at him; on answering in the negative, he stated that he thought I had. His suspicious mental attitude on admission is best illustrated by the remark here quoted.

Case No. 3207. The patient shows marked confusion. She is very weak and does not seem to know what she is doing. She expectorates on the lid of her sputum box and does not seem to know that she does it. She does not know whether it is day or night, and keeps asking for milk or water when she is holding the cup in her hand. She takes up her sputum cup, also her drinking cup, and throws them around. She does not seem to be accountable for anything she says or does.

Case No. 3749. Patient was delirious all night. She says she was at home last night, but is afraid her people will take her home to-day, and she

does not want to go. She claims that one of the other patients stole some candy from her, and that they annoy her so much by being near her. She always thinks there is some one waiting to see her, and says she wishes they would go away as she does not want to see them.

Case No. 3050. 2—11—'05: This patient has been rambling since her admission; she thinks she sees cheese on the tables around her. She asks for different things to eat, but does not want them after she gets them. 2—18—'05: Patient lost her ring, which was found in her bed-clothes, but until it was found, she thought it was in different places in the ward. When any one went near her, she told them it was under one of the beds or on the floor. 2—19—'05: She imagines that everything she sees is ice-cream, and that the other patients around her are not being fed. 2—21—'05: She has been asking for crackers to-day, and upon seeing a tablet, remarked, "I thought you said you did not have any crackers." When asked what she meant she said that there was one on the table. She had mistaken the paper for a cracker. When asked if she had rested during the night, she stated that she had never closed an eye, while the night nurse claims that she sleeps most of the night. 2—23—'05: Patient wants to be moved to another bed in the ward. She claims that she is too hot in her bed and that she will not sleep there to-night. This case presents a confusional type with marked loss of memory.

Case No. 1518. This patient also presents marked loss of memory and confusion. She throws papers on the floor, etc., and says she did not do it. There is great difficulty in making her take nourishment. She promises to take her milk, but when the nurse leaves her, she begs one of the other patients to throw it out for her. She is contrary in everything, and is very hard to manage at times.

Case No. 3537. Patient imagines she is in the hospital for an operation on her eye. When she leaves the ward, she does not know her way back to her bed. She puts her clothes in the ward linen-bag, and then says we took them from her. She states that she gets nothing to eat, it is milk all the time. She gets regular diet, but eats very little. She imagines every one is putting their soiled clothes on her bed. Patient asked the night nurse not to forget to give her the stockings she had promised her. She now imagines that she is in the hospital for an operation on her nose. She claims she knows she has not as many noses as are on her face.

Case No. 3121. Patient presents delusions of persecution. 3—23—'05: She refused to take her medicine at 8 P. M., also milk at both lunches. 3—24—'05: The nurses have great difficulty in persuading her to take her diet or to do anything she is told to do. She will not do anything she is told to do until the head nurse is brought in to talk to her. She claims that everybody

dislikes her, and that is what makes everything she says or does wrong. She told the nurse that she had a small bottle of carbolic acid and some pills, but would not show them. She then stated that she had thrown them out. Patient refuses to rub with her oil, at night, until she is ready, and she does not want to go to bed at night, or to get up at the proper time. When she was told to get up at a certain time, she would not do so, but would sit up in her bed and call out to the nurse.

MUSCULAR POWER.

Number of patients whose muscular power.....	As indicated by the grip was.....	Good,.....	32	} 176
		Fair,.....	52	
		Poor,.....	35	
		Above normal,.....	2	
		Not recorded,.....	55	
	In upper extremities was.....	Good,.....	62	} 176
		Fair,.....	69	
		Poor,.....	28	
		Above normal,.....	2	
		Not recorded,.....	15	
	In lower extremities was.....	Good,.....	54	} 176
		Fair,.....	35	
		Poor,.....	27	
		Above normal,.....	1	
		Not recorded,.....	59	

The muscular power is determined by gross tests, such as resistance to various muscular movements. In the case of the lower arm muscles the dynamometer was used, and the statistics based upon these measurements are necessarily more accurate than the others. In the use of the dynamometer in the statistics here reported, the following arbitrary division was used. The cases showing a record with the dynamometer of below fifty are recorded as being poor, those from fifty to eighty as fair, and those above eighty as being good.

COORDINATION.

Number of patients whose static coördination was.....	Good,.....	135	} 176
	Fair,.....	8	
	Swaying,.....	5	
	In bed,.....	7	
	No record,.....	21	

The coördination of the muscular system is determined as a

part of the routine examination. In advanced cases it is extremely difficult to differentiate between the swaying of weakness and that due to incoördination of the muscular and nervous systems. The above statistics are therefore of relatively little value as statistics, and were only intended for consideration with the individual cases in which they occur.

REFLEXES.

Number of patients whose reflex was.....	Ulnar reflex,.....	Present,.....	78	} 176
		Exaggerated,.....	3	
		Markedly exaggerated,....	1	
		Diminished,.....	3	
		Doubtful,.....	2	
		Absent,.....	49	
		Not recorded,.....	40	
	Supraorbital reflex,.....	Normal,.....	103	} 176
		Exaggerated,.....	2	
		Markedly exaggerated,....	1	
		Diminished,.....	4	
		Absent,.....	13	
		Not recorded,.....	53	
	Pupils,.....	React to light,.....	154	} Out of 176
		Equal,.....	122	
		Dilated,.....	11	
Number of patients whose tendon jerk was.....	Biceps jerk,.....	Normal,.....	42	} 176
		Quickened,.....	83	
		Exaggerated,.....	27	
		Markedly exaggerated,.....	1	
		Diminished,.....	1	
		Absent,.....	1	
		Not recorded,.....	21	
	Triceps jerk,.....	Normal,.....	38	} 176
		Quickened,.....	74	
		Exaggerated,.....	28	
		Markedly exaggerated,.....	2	
		Absent,.....	3	
	Knee jerk,.....	Not recorded,.....	31	} 176
		Normal,.....	31	
		Quickened,.....	79	
		Exaggerated,.....	30	
		Markedly exaggerated,.....	7	
	Tendo-Achilles jerk,	Diminished,.....	1	} 176
		Absent,.....	3	
		Not recorded,.....	25	
		Normal,.....	35	
		Quickened,.....	66	
		Exaggerated,.....	7	
		Absent,.....	4	
		Not recorded,.....	64	

A study of the reflexes in tuberculosis during the past year has confirmed the ideas presented in the previous reports. The reflexes, as a rule, are quickened and sometimes exaggerated.

CRANIAL NERVES.

Number of patients who had.	{	Cranial nerves normal,.....	141	}	Out of 176
		Poor hearing,.....	12		
		Trouble with eyes,.....	14		
		Delayed cerebation,.....	1		
		Poor taste,.....	2		
		Poor smell,.....	2		

The examination of the cranial nerves was made as part of the routine examination. The poor hearing above noted could not be considered in any of the cases as an involvement of the auditory nerve. The frequency of ear trouble in tuberculosis would easily account for this number of cases. Headache as a result of eye trouble is not infrequently met with, and is often the result of an attempt to read while in a recumbent position; this is rendered all the more difficult by a weakened condition of the eye muscles. Weakened convergence is not infrequently met with in advanced cases of pulmonary tuberculosis, and can, I think, be attributed to the fact that the eye muscles share in the general muscular nutritional atrophy and wasting.

VASOMOTOR TONE.

Number of patients.	{	Whose vasomotor tone was.....	{	Good,.....	39	}	176
				Fair,.....	87		
				Poor,.....	24		
		Who had.....	{	Flushing of face,.....	3		
				No record,.....	23		

VON GRAEFE SIGN.

Number of patients who had the v. Graefe sign,.....	{	Marked,.....	1	}	176
		Slight,.....	29		
		Absent,.....	135		
		Not recorded,.....	11		

RETRACTION OF EYELIDS.

Number of patients who had retraction of eyelid, ...	{	Moderate,.....	1	}	176
		Slight,.....	22		
		Absent,.....	136		
		Not recorded,.....	17		

DISTURBANCE OF THE SYMPATHETIC SYSTEM.

In the First and Second Annual Reports our attention was directed to the presence of a syndrome in tuberculosis which resembles that seen in Grave's disease, and which sometimes develops into a fully developed case of that disease. The analysis of the symptomatic disturbance of the sympathetic system which may be regarded as the constituent elements of Grave's disease gave the following results:

Tremor is present in one hundred and fifteen cases out of one hundred and seventy-six. It is not present in forty-six cases, and in fifteen cases there is no record. The tremor, as a rule, is a fine rhythmic movement of the fingers, and can easily be brought out by holding the hands and fingers in marked extension. A study of the dynamometer records and temperature charts shows that this tremor is independent of loss of muscular strength and fever reaction. It is found present when the dynamometer record is normal, and in some cases above normal.

D. J. MCCARTHY.

DEATH IN PULMONARY TUBERCULOSIS.

Tuberculosis of the lungs is a slowly progressive malady in which there is almost invariably extensive destruction of pulmonary tissue either through cavity formation or infiltration, with terminal infiltration of intra-abdominal organs. In addition to the destruction of pulmonary tissue, an important factor in bringing about a fatal termination would seem to be the wide-spread degenerative changes in the viscera, the result of the absorption of poisonous toxins from the lung lesions. As a result of these changes the normal physiological functions are seriously impaired and a gradual failure of strength ensues.

Another factor of somewhat less importance is the mechanical effect produced by the tuberculous changes in the lungs. It is somewhat difficult in many cases to estimate to what extent the destruction of pulmonary tissue interferes with the proper performance of the respiratory function. Mere blockage of the air-spaces with tuberculous material rarely exists sufficiently to cause fatal embarrassment of the respiratory function in man. In monkeys, however, tuberculous infiltration of the lungs is occasionally so extensive that mechanical obstruction must be looked upon as a prominent factor in causing death (C. Y. White).

Eliminating the comparatively few cases of pulmonary tuberculosis that terminate by reason of some sudden occurrence, such as a hemorrhage, a pneumothorax, or an intestinal perforation, there remains a large group of cases in which death apparently is due to asthenia; that is, there is a gradual failure of various vital organs to properly perform their functions. As a result of malnutrition, of fever, and of the absorption of poisonous toxins

marked cardiac weakness, especially, supervenes. Limitation of the respiratory area, with consequent deficient aëration of the blood and carbonic-acid poisoning, is also a factor in some instances (Cornet).

CAUSES OF DEATH IN THE CASES OF THE LAST TWO YEARS.

Asthenia alone,.....	42	} Out of 136 cases
Asthenia in association with ..	{ Laryngeal involvement, ... 17	
	{ Violent diarrhea,..... 12	
	{ Severe pleuritic pain, ... 12	
	{ Distressing dyspnea,..... 14	
	{ Dyspnea and cyanosis,..... 5	
Pneumothorax, ... 8		
Pulmonary hemorrhage,.....	{ Immediate, ... 7	
	{ Remote, ... 4	
Intestinal hemorrhage,..... 3		
Intestinal perforation and peritonitis, ... 6		
Convulsions, ... {	Uremic,..... 2	
	Meningitic, ... 1	
No record, ... 3		

Asthenia.—Of the one hundred and thirty-six cases under consideration death was apparently due to asthenia in one hundred and two; forty-two of these cases were instances of a gradual failure in strength day by day; in the remaining sixty the fatal issue was hastened by laryngeal involvement in seventeen, violent diarrhea in twelve, severe pleuritic pain in twelve, distressing dyspnea in fourteen, and dyspnea associated with cyanosis in five. These last-mentioned cases were in all probability instances of cardiac failure, although the fact that the heart may stop in systole makes this assertion difficult of proof at the autopsy table unless there is an associated congestion of the viscera. While cardiac failure does unquestionably play a prominent part, a comparison of the preagonal changes occurring in the temperature, pulse, and respiration shows the pulse to be less subject to change than either the temperature or respiration.

Pneumothorax was the cause of death in eight cases; in none of them, however, was the rupture attended by immediate death. It is well known that if the patient survives the immediate shock attending perforation of the lung, death is usually deferred for a

time. West states that death may occur as the result of pneumothorax in one of three ways: First, from suffocation as the result of the sudden embarrassment of the respiration or from shock. Nearly one-half of the cases die within the first week. Second, as the result of the effusion following the pneumothorax. In these cases death is caused indirectly as the result of the pneumothorax; the asthenia being increased by the absorption of toxic material from the purulent effusion. Third, in some instances the pneumothorax must be looked upon as simply a grave complication. In these cases the pneumothorax is not entirely responsible for the result, although it is a factor in accelerating the end. It must also be borne in mind that the patient may recover from the pneumothorax and yet eventually die of his tuberculosis.

Hemorrhage.—While pulmonary hemorrhage is commonly believed by the laity to be a frequent cause of death in phthisical individuals, it is, as a matter of fact, comparatively unusual. I have divided the fatalities from hemorrhage into two classes, immediate and remote. In the immediate cases (seven) death occurred at once or within a few minutes after the occurrence of the hemorrhage. In the remote cases (four) an acute exacerbation of the symptoms was noted after the occurrence of the hemorrhage or hemorrhages. Death in these cases is probably hastened not only by the loss of blood but also by the spread of the tuberculous process, through insufflation, to previously healthy lung tissue.

Intestinal Hemorrhage.—An extremely unusual terminal event in pulmonary tuberculosis is an intestinal hemorrhage. In two cases death occurred shortly after large intestinal hemorrhages. In a third instance (case No. 2657) there was a complicating purpura hæmorrhagica with hemorrhages from the intestines and nose. Intestinal ulcers were absent in this case.

Perforation of the Intestine and Peritonitis.—It has long been commented on that intestinal perforation in tuberculosis is a comparatively infrequent occurrence (about 1%). It certainly is

remarkable that, in view of the wide-spread ulceration present in many cases, perforation does not more frequently occur. In the series under consideration this accident occurred in six instances.

Death during convulsions is also an unusual termination. In view of the extensive changes found in the kidneys of many advanced cases of tuberculosis, uremic symptoms are surprisingly infrequent. It must be borne in mind, however, that some of the diarrheas in advanced tuberculosis are explainable on the ground of a compensatory action on the part of the bowel. Flick and Walsh have cited cases of this kind in which there was a well-marked nephritis and no intestinal lesions. Marked convulsions were noted in three cases at death; in two they were apparently uremic in origin; in the third case they were due to a unilateral meningitis.

Acute Infections.—Our knowledge of the part played by acute infections of various kinds in producing death in chronic tuberculosis is as yet somewhat imperfect. The article by Flick on the pneumococcic origin of pulmonary hemorrhage is highly suggestive in this connection. In thirty-six cases the spleen was noted as being much softened, and in some instances also enlarged; in other words, as having the characteristics of spleens met with in acute infections. Bronchopneumonia was not uncommonly present. (For further details as to this manifestation see White's autopsy report in the present volume.) In several cases the bacteriological examination of the different organs showed a general streptococcic infection. In some cases the terminal infection was an acute miliary tuberculosis of the lungs, the infecting source probably being the wall of an old cavity or an infiltrated area at the apex.

Sudden death from syncope in patients up and about the ward was not noted. This is a rare termination.

Time of Death.—It has long been believed that death occurs more frequently in the early morning than at any other time in the twenty-four hours. This has been attributed to the fact that the

MARK		Name <u>Age 19 Residence</u>												
PULSE		Disease <u>Tuberculosis of lungs Case No. 3548 Date January 31 - 1907</u>												
RESP														
TEMP														
DAY OF MONTH		31	1	2	3	4	5	6	7	8	9	10	11	12
DAY OF DISEASE		Jan.	February											
TIME OF DAY		A.M.	6	6	6	6	6	6	6	6	6	6	6	6
		P.M.	4	4	4	4	4	4	4	4	4	4	4	4
PULSE		170	170	170	170	170	170	170	170	170	170	170	170	170
RESP.		43	43	43	43	43	43	43	43	43	43	43	43	43
TEMP.		+08	+08	+08	+08	+08	+08	+08	+08	+08	+08	+08	+08	+08
		+07	+07	+07	+07	+07	+07	+07	+07	+07	+07	+07	+07	+07
		+06	+06	+06	+06	+06	+06	+06	+06	+06	+06	+06	+06	+06
		+05	+05	+05	+05	+05	+05	+05	+05	+05	+05	+05	+05	+05
		+04	+04	+04	+04	+04	+04	+04	+04	+04	+04	+04	+04	+04
		+03	+03	+03	+03	+03	+03	+03	+03	+03	+03	+03	+03	+03
		+02	+02	+02	+02	+02	+02	+02	+02	+02	+02	+02	+02	+02
		+01	+01	+01	+01	+01	+01	+01	+01	+01	+01	+01	+01	+01
		+00	+00	+00	+00	+00	+00	+00	+00	+00	+00	+00	+00	+00
		-01	-01	-01	-01	-01	-01	-01	-01	-01	-01	-01	-01	-01
		-02	-02	-02	-02	-02	-02	-02	-02	-02	-02	-02	-02	-02
		-03	-03	-03	-03	-03	-03	-03	-03	-03	-03	-03	-03	-03
		-04	-04	-04	-04	-04	-04	-04	-04	-04	-04	-04	-04	-04
		-05	-05	-05	-05	-05	-05	-05	-05	-05	-05	-05	-05	-05
		-06	-06	-06	-06	-06	-06	-06	-06	-06	-06	-06	-06	-06
		-07	-07	-07	-07	-07	-07	-07	-07	-07	-07	-07	-07	-07
		-08	-08	-08	-08	-08	-08	-08	-08	-08	-08	-08	-08	-08
		-09	-09	-09	-09	-09	-09	-09	-09	-09	-09	-09	-09	-09
		-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
		-11	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11
		-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12
		-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13
		-14	-14	-14	-14	-14	-14	-14	-14	-14	-14	-14	-14	-14
		-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15
		-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16
		-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17
		-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18
		-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19
		-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20
		-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21
		-22	-22	-22	-22	-22	-22	-22	-22	-22	-22	-22	-22	-22
		-23	-23	-23	-23	-23	-2							

Graphic Clinical Chart, designed by J. P. Crozer Griffith, M.D. Copyrighted, 1889, and for sale by P. Blakiston's Son & Co., 1012 Walnut St., Philadelphia.

FIG. 1.—Chart of a case dying of tuberculosis of the lungs.

vital forces are at the lowest ebb at this time. Of ninety-six cases in which the actual time of death was recorded:

Twenty-nine	died between	midnight and 6 A. M.
Twenty-one	" "	6 A. M. and noon.
Thirty	" "	noon and 6 P. M.
Sixteen	" "	6 P. M. and midnight.

It is obvious that such a very small number of cases is of little value. Marsh* analyzed 36,000 records, omitting only deaths from accident or suicide. His results are interesting, as they are at variance with the commonly expressed view. Marsh found from the records investigated, that more deaths occurred between 2 and 6 P. M., *i. e.*, the very time when the vitality is supposed to be highest. He also found that the fewest deaths occurred between 7 P. M. and midnight. In women the time of death tends to occur a little earlier than in men, and in children a little earlier than in women.

Time of the Year.—Our records relating to the time of year in which the most deaths occur are also too meager to be of much value. The distribution of the one hundred and thirty-six cases was as follows:

January, six; February, nineteen; March, ten; April, eight; May, twelve; June, fifteen; July, seven; August, seventeen; September, fourteen; October, six; November, nineteen; December, three.

Temperature, Pulse, and Respiration.—A study of the temperature, pulse, and respiration during the last few days of life showed that in the majority of cases as death approached the temperature fell rapidly to subnormal while the pulse and respirations were greatly increased in frequency. The accompanying chart (Fig. 1), taken from one of the dying cases, illustrates this very well. The variations which may be present can be seen from the following figures, which give the frequency of the preagonal changes:

* Marsh: Jour. Amer. Med. Assoc., Dec. 22, 1906, editorial.

Temperature, ...	{ Rise in 19 cases. Fall to subnormal in 80 cases. No change in 37 cases.
Pulse, ...	{ Increased in 54 cases. Diminished in 34 cases. No change in 48 cases.
Respirations, ...	{ Increased in 81 cases. Diminished in 27 cases. No change in 28 cases.

In five cases the temperature was continuous in type and markedly higher for the last two or three weeks of life. In eighteen cases there was a persistent subnormal temperature for a number of days previous to death. A subnormal temperature and a low pulse-rate are very suggestive of meningeal involvement.

Mental Attitude.—The mental attitude of the dying has always been the subject of much speculation. It has long been the belief that extreme hopefulness up to the very end was characteristic of the consumptive. According to the experience of McCarthy and Carncross (see Second Annual Report and present report), the so-called *spes phthisica* is not by any means the usual mental attitude in chronic tuberculosis; as a matter of fact, it is more frequently absent than present. While our notes on this aspect of life are very deficient, there is no reason to believe that death from phthisis, so far as the mental attitude is concerned, differs in any particular from that of any other chronic disease. In those cases which are free from bodily pain unconsciousness usually comes on some hours before death. No less than fifty-five of the one hundred and thirty-six cases suffered from pain of one sort or another (pleuritic, laryngeal, difficulty in breathing) in the terminal stages of the disease.

In those cases in which there were notes on the mental condition, fourteen were stated to be delirious, twelve stuporous, seven were very restless, three were anxious as to their condition, three were very nervous and cried on the slightest provocation, two were hopeful to the very end, and two expressed hopelessness as to their recovery.

H. R. M. LANDIS.

AUTOPSY REPORT OF THE YEAR.

INTRODUCTION.

In this year's report of the Pathological Department it has been thought well to analyze the findings at autopsy and in the histological studies in connection with the general literature on the subject. In commenting on the statistics presented no attempt has been made to discuss every phase of tuberculosis, but merely to present our findings in a comprehensive way.

The autopsy protocol of the Institute has been followed and each case has been tabulated systematically. The processes here tabulated are the findings on the autopsy table, yet they are not to be considered agonal, but in the great majority of cases the final conditions in the slow progress of a chronic tuberculosis, in which earlier stages of the disease would be represented by similar though less extensive or less distributed lesions.

The records have been made in such a way that they can be compared with the charts made by the clinician. The value of this plan will be seen when the whole record of a case is carefully studied.

Drs. M. P. Ravenel and J. W. Irwin, bacteriologists of the Institute, have cultured all organs at the time of autopsy and present their findings in a special bacteriological report.

Dr. D. J. McCarthy has made a study of the nervous system of the cases, which he incorporates in a special report.

Dr. Joseph Walsh has continued the study of kidney changes found in the cases autopsied, and reports his work in a special article.

This report gives the gross changes in the organs as seen on the autopsy table, together with the histological changes in some of the

organs. The histological examinations have been made from the standpoint of general rather than specific changes, such as tubercles, and frequently present a different picture to what would be expected from the gross descriptions of the organs.

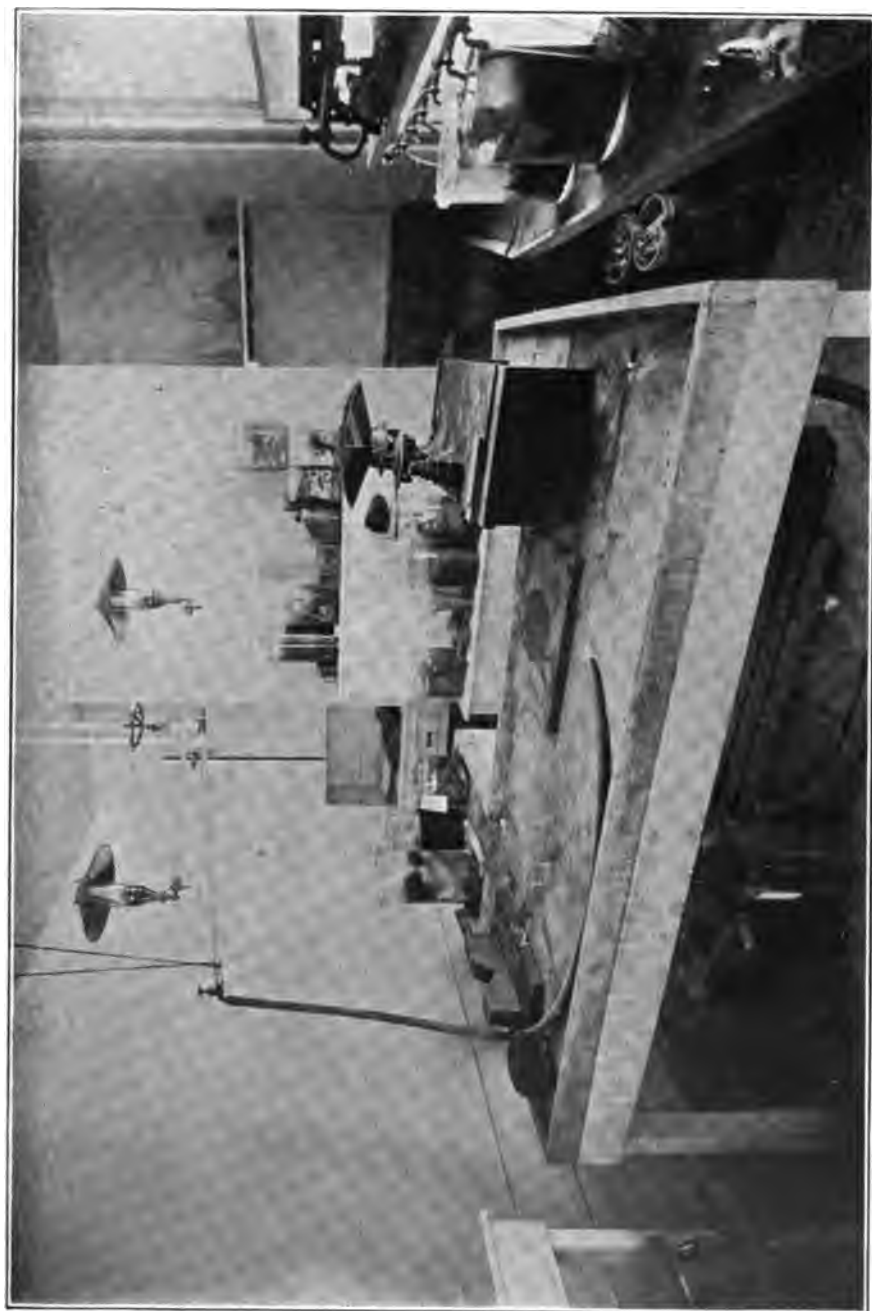
It was not possible to record the examination of every organ histologically for various reasons, especially in the early days of the Institute, hence the number of the different organs examined histologically differs from the number of autopsies; for instance, though we had fifty-seven autopsies on tuberculous subjects, there is a histological report on only fifty-four livers and fifty-three spleens. The number of cases in which a particular organ was examined is stated in the table of the findings in connection with that organ, and the percentage frequency of the different changes has been calculated upon the number of cases in which the organ was examined.

We give the summary of the findings of all autopsies in the Institute up to the present, for the convenience of the investigator, where this can be done consistently. We feel called upon to say, however, in regard to these summaries that their value is detracted from by the less efficient methods in vogue during the formative period of the Institute.

AUTOPSIES.

Sixty cases were autopsied during the year, all except three being cases of advanced chronic pulmonary tuberculosis. Two of these three non-tuberculous cases were cardio-vascular cases, and the remaining one a case of chronic bronchopneumonia with cirrhosis of the liver.

The fact that the wards of the Institute are intended only for advanced cases of pulmonary tuberculosis makes the clinical and autopsy records of limited value in regard to the location of the early lesions and the mode of infection. For determining these, studies must be made experimentally upon animals, or upon autopsy material collected in cases dying from other causes than



Autopsy room.

tuberculosis, in which the tuberculous lesions are small and in the early stages of development. Our statistics are, however, especially valuable in the study of the late stages. In this regard our findings agree in a general way with the usually accepted views of the progress of the disease.

The overwhelming majority of our cases may be divided into two classes, in both of which death was caused, according to the autopsy findings, by what might be called mechanical interference and physiological loss of function brought about by extensive pathological change rather than by a virulent toxemia.

The first of these two classes shows the lungs extensively diseased either by the tuberculous process alone, or by the tuberculous process in conjunction with such changes as are referable to a secondary or mixed infection.

The picture presented in this class of cases shows extensive loss of lung tissue from cavitation with infiltration of the greater part of the remainder of the lungs. Besides these changes there are the usual secondary changes in the other organs, consisting of pathological alterations in the parenchyma and the distribution of a certain number of terminal tubercles.

The second class of cases shows a more or less similar lung picture, sometimes with the same amount of lung involvement and sometimes with less, but with changes in the other organs far more extensive, such as amyloid changes in the liver and spleen of an extent which leaves the normal structure of these organs scarcely evident; or tuberculous ulcerations in the intestine so widespread as to seriously interfere with the function of this organ.

Both of these classes presenting practically the same lung picture and differing only in the distribution of the purely tuberculous process in other organs or the extensiveness of the secondary changes, show that death is caused by serious interference with the physiological function of the organs rather than an acute toxic condition, and such is to be expected from the chronicity of the disease and the evident low toxicity of the tuberculous process.

MEASUREMENT AND WEIGHT OF THE BODY AND ORGANS COMPARED WITH THE STANDARD WEIGHT OF THE BODY FOR THE HEIGHT AND AGE.

Case Number.	Sex.	Age.	Height.	Normal Weight.	Highest Weight.	Average Weight, in Pounds.	Last Weight, in Pounds.	Heart.	Liver.	Spleen.	Pancreas.	L. Lung.	R. Lung.	L. Kidney.	R. Kidney.	Appendix.
73	F.	38	N. R.	N. R.	139	N. R.	90	12×9×6	25.5×25.5×12	16×10×6	N. R.	25×14×6	23×15×6.5	14×5.5×3	12×8×2.5	5
106	M.	27	N. R.	N. R.	144	N. R.	98	27×9	30.40 G. 26.5×22×9	360 G. 17.5×11×5	16×4×2	28×14×8.5	9.20 G.	240 G.	240 G.	N. R.
302	M.	43	N. R.	N. R.	173	N. R.	146	12×9×5	23.5×18×9	496 G. 14×8.5×2.5	N. R.	25×21×8	25×10×7	11.5×7×2.5	11×6×2.5	6
388	M.	28	5	159	150	143	126	9×7×0×4	23×24×8	155 G. 16×10×5	20×4×1.5	27×10×5	24×16×5	11×6×2.5	11×6×2.5	7
781	F.	35	5	122	135	135	109	9×8×4.5	22.7 G. 18×17×7	450 G. 13×8×3	12.4 G. 18×4×1.5	713 G.	630 G.	12.4 G.	12.4 G.	4
975	M.	19	5	104	156	N. R.	N. R.	12×10×5	15.81 G. 26×25×8	139 G. 14×9×4	78 G.	23×20×6.5	25×16×6.5	13×6.5×3.5	13×6×3.5	4
1767	F.	35	5	34	132	125	108	11×8×5	18.60 G. 26.5×20×6.5	186 G. 10.5×6×2.5	12.4 G. 18×4.5×2.5	21×13×4	24×14×6	11.5×5×2.5	11.5×5.5×3	6
2284	F.	42	5	7	250	N. R.	N. R.	13×11×5.5	13.50 G. 28×18×10	109 G. 12.5×8×7	18×4.5×2.5	23×14×7	26×10×15	12.7×5	12.7×5	8.5
2388	M.	43	5	114	177	155	106	12.5×9×7	22.18 G. 22×21×7.5	235 G. 13×9×5	155 G.	890 G.	405 G.	279 G.	279 G.	8
2481	M.	38	5	11	173	168	N. R.	12×10×3	16.74 G. 25×16×8.5	357 G. 11.5×8×3	16×4.5×2	8.25 G.	N. R.	155 G.	170 G.	7
2632	M.	24	6	172	219	180	150	12×10×4.5	13.50 G. 25×20×8	155 G. 15×11×5	108.5 G.	821.5 G.	23×15×6	204.5 G.	201.5 G.	5
2672	M.	32	5	10	164	165	107	11×10×4.5	7.51 G. 22×18×8.5	326 G. 13×9×5	109 G.	760 G.	713 G.	12.5×6×3.5	12.5×6×3.5	8
2676	M.	40	5	94	165	164	103	10×11×4	23.56 G. 20×30×7.5	227 G. 13.5×8×3.5	110 G.	25×14×8	25×18×7	12.6×4	12.6×4	7
2764	M.	24	5	10	157	148	117	15×12.5×7	23.25 G. 28×17×6	217 G. 12×9×4.5	155 G.	24×9×14	N. R.	12.5×5.5×3.5	11.5×6.5×3.5	12
2780	M.	25	5	24	125	130	87	12×9×5	21×18×7	217 G. 12×9×2	100 G.	24×16×6	26×16×7.5	12×6×3.5	12×6×3.5	6
2828	M.	17	5	42	128	117	114	N. R.	1.289 G. 21×7.5	186 G. 14×7×3	N. R.	915 G.	N. R.	155 G.	140 G.	11
2957	M.	35	5	6	147	132	114	N. R.	17.05 G. 90×21×6	140 G. 10×6×2.5	N. R.	16×10×5	N. R.	12.6×4	12.6×4	6
2977	F.	28	5	44	130	135	N. R.	10×8×5	16.12 G. 24×12×10	100 G. 14×8×8	12.4 G.	N. R.	N. R.	12×6.5×3	12×6×2.5	7
3050	F.	25	5	34	125	117	102	N. R.	22.70 G. 26×18×8	264 G. 13×6.5×3	109 G.	18×8.5×8	22×18×8	14×6.5×3.5	14×6×3.5	6.5
											18×5×2	N. R.	N. R.	202 G.	202 G.	
											108 G.			13×6×3	14×7×3	
														195 G.	195 G.	

3054	M.	28	5	8	151	150	145	120	285 g.	24X23X7 170 g.	19X8.5X2.75 186 g.	N. R.	N. R.	N. R.	26X16X8 117 g.	23X20X7 84 g.	11.5X6X3 70 g.	11.5X5.5X3.5 186 g.	7
3096	M.	47	5	5 1/2	148	160	150	128	295 g.	28X18X8.5 235 g.	13.5X10.5X3 320 g.	9X5X2 71 g.	9X5X2 71 g.	9X5X2 71 g.	26X16X8 117 g.	23X20X7 84 g.	11.5X6X3 70 g.	11.5X5.5X3.5 186 g.	0
3117	M.	27	6	1	175	156	150	111	158X6 135 g.	30X17X8 219 g.	10.9X4 403 g.	16X4X2 135 g.	16X4X2 135 g.	16X4X2 135 g.	27X18X7.5 186 g.	13X6X3.5 104 g.	12X6.5X3.5 232 g.	12X6.5X3.5 232 g.	6
3190	M.	27	5	4	134	140	135	108	N. R.	26X17.5X6 170 g.	12X8X4 171 g.	15X4X1.5 105 g.	15X4X1.5 105 g.	15X4X1.5 105 g.	N. R.	13X6.5X3.5 104 g.	12X6.5X3.5 232 g.	12X6.5X3.5 232 g.	5
3133	F.	29	5	2	123	139	120	81	14X6.5X3.5 270 g.	30X21X8 219 g.	13.5X8X4 217 g.	19X7X1.5 93 g.	19X7X1.5 93 g.	19X7X1.5 93 g.	23X16.5X7 124 g.	23X16.5X7 124 g.	12.5X7X2.5 100 g.	12.5X7X2.5 100 g.	9.5
3144	M.	26	5	7 1/2	147	132	117	96	12X11X5 403 g.	28X22X9 249 g.	13.9X3 350 g.	18.5X2 138 g.	18.5X2 138 g.	18.5X2 138 g.	20X12X6 137 g.	12X6X3.5 170 g.	12.5X3.5X5.5 155 g.	12.5X3.5X5.5 155 g.	13
3156	M.	28	N. R.	N. R.	N. R.	N. R.	118		14X12X4.5 504 g.	28X22X6.5 249 g.	16.9X4.5 270 g.	N. R.	N. R.	N. R.	26X17X7 147 g.	26X17X7 147 g.	12X6X3.5 170 g.	12X6X3.5 170 g.	7
3163	F.	53	5	11	177	185	170	119	11X11.5X5 419 g.	32X21X5.5 273 g.	17.9X3 240 g.	21.5X2.5X1.5 140 g.	21.5X2.5X1.5 140 g.	21.5X2.5X1.5 140 g.	23X18X4.5 109 g.	23X18X4.5 109 g.	13.5X8X3 233 g.	13.5X8X3 233 g.	8
3182	F.	14	5	1	108	100	97	94	11X10.5X4.5 270 g.	25X20X9 179 g.	14.9X3.5 170 g.	16X5X3 109 g.	16X5X3 109 g.	16X5X3 109 g.	25X11X7 154 g.	11.5X7X4 186 g.	10.5X6X2.5 155 g.	10.5X6X2.5 155 g.	11
3207	F.	45	5	4 1/2	138	140	135	90	11X9X4.5 264 g.	28X16X8 149 g.	14X8X4.5 204 g.	18.5X5X2 109 g.	18.5X5X2 109 g.	18.5X5X2 109 g.	24X16X8 147 g.	12X5X4 140 g.	13X5.5X3.5 171 g.	13X5.5X3.5 171 g.	5
3215	M.	35	5	9	159	140	130	84	24X22.5X9 213 g.	24X22.5X9 213 g.	14.5X8.5X3 233 g.	N. R.	N. R.	N. R.	13X4.5X2 140 g.	13X4.5X2 140 g.	13X4.5X2 140 g.	13X4.5X2 140 g.	4
3220	M.	42	5	1 1/2	128	132	125	87	13X10X5 310 g.	24X8X9 164 g.	13X7X2 130 g.	16X4X2 109 g.	16X4X2 109 g.	16X4X2 109 g.	22X11X10 102 g.	11X7X3.5 186 g.	11X6X3 155 g.	11X6X3 155 g.	8
3251	M.	55	N. R.	N. R.	N. R.	124	132	91	N. R.	24X15X8 133 g.	13.5X9X3.5 155 g.	18X3.5X2 109 g.	18X3.5X2 109 g.	18X3.5X2 109 g.	24X12X6 102 g.	12X6X3 186 g.	12X6X3 186 g.	12X6X3 186 g.	6
3253	M.	N. R.	N. R.	N. R.	N. R.	N. R.	N. R.	N. R.	11X9.5X5 270 g.	28X18X8.5 248 g.	19X8X7 173 g.	15X4X2 109 g.	15X4X2 109 g.	15X4X2 109 g.	22X13X6 101 g.	14X6.5X3.5 357 g.	15X8X4 270 g.	15X8X4 270 g.	7
3264	M.	57	N. R.	N. R.	N. R.	169	163	131	10X10X10.5 372 g.	25X18X8 192 g.	13X8.5X2 155 g.	N. R.	N. R.	N. R.	23X11X7 130 g.	12X4.5X3.5 302 g.	12X4.5X3.5 302 g.	12X4.5X3.5 302 g.	5
3359	M.	46	5	8	161	160	135	111	13X5X13 372 g.	24X18X8 170 g.	13X8.5X2 155 g.	18X3.5X2 109 g.	18X3.5X2 109 g.	18X3.5X2 109 g.	24X17X4.5 101 g.	12X5X3 202 g.	12X5X3 202 g.	12X5X3 202 g.	5
3355	F.	28	5	3	125	125	123	87	9.5X10X10.5 405 g.	24.5X17.5X8 177 g.	9X6.5X2.5 135 g.	15X4.5X1.5 140 g.	15X4.5X1.5 140 g.	15X4.5X1.5 140 g.	23X15X7.5 127 g.	10X5X3.5 155 g.	10X5X3.5 155 g.	10X5X3.5 155 g.	9.5
3388	M.	36	N. R.	N. R.	N. R.	N. R.	N. R.	N. R.	17X6 108 g.	17X6 108 g.	12X3X6.5 107 g.	18.5X2.5X2.5 124 g.	18.5X2.5X2.5 124 g.	18.5X2.5X2.5 124 g.	9X21X9.5 651 g.	12X6X4.5 140 g.	12X6X4.5 140 g.	12X6X4.5 140 g.	9
3404	M.	30	6	2 1/2	187	185	N. R.	130	12X10X6.5 357 g.	29X20X9.5 287 g.	14X11X3.5 285 g.	22X5X2.5 233 g.	22X5X2.5 233 g.	22X5X2.5 233 g.	14.5X7X3.5 233 g.	14.5X7X3.5 233 g.	13X6.5X3.5 233 g.	13X6.5X3.5 233 g.	8.5
3405	M.	33	5	7 1/2	153	140	135	103	9.5X10X7 372 g.	28X18X8 205 g.	13X8X4 194 g.	18X3X1.5 124 g.	18X3X1.5 124 g.	18X3X1.5 124 g.	26X15X7 690 g.	11.5X6X1.5 155 g.	11.5X6X1.5 155 g.	11.5X6X1.5 155 g.	11
3432	F.	20	5	6	130	117	N. R.	N. R.	11X8X4.5 171 g.	25X21X4 202 g.	11X6.5X2.5 93 g.	14X4.5X1.5 62 g.	14X4.5X1.5 62 g.	14X4.5X1.5 62 g.	24X15X5 837 g.	13X4.5X3 140 g.	13X4.5X3 140 g.	13X4.5X3 140 g.	10
3435	F.	26	5	5	132	Not weighed	95		9.5X9.5X5 227 g.	26X20X8 215 g.	10X10X4 326 g.	17X4.5X2 140 g.	17X4.5X2 140 g.	17X4.5X2 140 g.	16X5X8 130 g.	11X5X3 134 g.	11X5X3 134 g.	11X5X3 134 g.	5
3440	M.	26	5	9	154	160	154	109	N. R.	23X18X7 148 g.	12X8X3.5 217 g.	14X4X2 171 g.	14X4X2 171 g.	14X4X2 171 g.	26X15X7 1105 g.	12X6X3 171 g.	12X6X3 171 g.	12X6X3 171 g.	9
3451	F.	20	5	5 1/2	132	140	126	108	14X12X11 481 g.	20X17X17 1038 g.	12X5.5X3 141 g.	N. R.	N. R.	N. R.	13X23X7.5 790 g.	11X6X3.5 863 g.	11X6X3.5 863 g.	11X6X3.5 863 g.	9

N. R. stands for not recorded.
The normal weight is calculated from the height and age according to the New York Life Insurance Company's standard table.
The measurements of the organs are in centimeters.

MEASUREMENT AND WEIGHT OF THE BODY AND ORGANS COMPARED WITH THE STANDARD WEIGHT OF THE BODY FOR THE HEIGHT AND AGE.—(Continued.)

CASE NUMBER	SEX	AGE	HEIGHT	NORMAL WEIGHT	HIGHEST WEIGHT	AVERAGE WEIGHT	LAST WEIGHT	HEART	LIVER	SPLEEN	PANCREAS	L. LUNG	R. LUNG	L. KIDNEY	R. KIDNEY	APPENDIX
3474	F.	34	5 8½	148	176	150	N. R.	9×9×10 1531 g.	24×24×8 1581 g.	14×9×3 231 g.	18.5×3×1.5 78 g.	26×14×7 884 g.	26×13×7 1040 g.	10×6×2.5 124 g.	9.5×5.5×2 100 g.	13
3499	M.	24	N. R.	N. R.	170	160	N. R.	6.5×6×5 231 g.	18×12×8×6 1689 g.	9×5.5×3 261 g.	12.4×2 124 g.	15×14×5 704 g.	15×14×5 704 g.	6×4×2.5 171 g.	6×4×2.5 171 g.	5.5
3512	M.	48	5 8	161	160	145	108	13×11×7 326 g.	22×17×14 1844 g.	12×7×4 233 g.	14×6×2×2 146 g.	19×12×7 701 g.	22×7×0.5 22 g.	10×5×3 124 g.	10×5×3 124 g.	6
3519	F.	38	5 2	127	114	95	81	9×8×8 332.5 g.	30×23×7.5 1891 g.	14.5×8×3.5 201.5 g.	18×4.5×2 170.5 g.	26×16×7 1085 g.	22×20×8 651 g.	12×6.5×4 248 g.	11.5×7×3.5 202.5 g.	N. R.
3521	M.	55	5 5½	151	182	170	N. R.	8×10×10 357 g.	21×17×9 1795 g.	13×9×2.5 155 g.	35×5.5×3 109 g.	24×17×7 1126 g.	25×18×7 791 g.	13×6×3 202 g.	13×6×3 186 g.	7
3526	M.	33	5 4	137	160	140	N. R.	18×18×9 277 g.	18×18×5 1707 g.	10×6×3.5 310 g.	12×4×2 109 g.	18×8×8 901 g.	15×10×8 1426 g.	6×4×3 211 g.	6×4×3 211 g.	5
3537	F.	67	5 4½	150	167	N. R.	96	13.5×11.5×4.5 388 g.	23.5×5.5×6 1209 g.	14×7×2.5 248 g.	17×3.5×1.5 109 g.	27×15×5 574 g.	25×15×6 682 g.	11×5×3 202 g.	11×5×3 202 g.	N. R.
3547	M.	38	5 8	157	130	125	94	8×10×10×3 248 g.	26×22×6.5 1740 g.	11.5×6.5×2.5 105 g.	15×3×1.25 120 g.	24×12×8 960 g.	28×15×8 940 g.	12×6×3 135 g.	11.5×6.5×3 135 g.	7
3559	F.	26	N. R.	N. R.	138	138	N. R.	9×9×5 403 g.	28×24×7.5 1860 g.	10×6×2 124 g.	22×4.5×1.5 217 g.	22×12×5.5 469 g.	21×16×6.5 1225 g.	10.5×5×2.5 202 g.	10.5×5×2.5 202 g.	N. R.
3560	F.	32	5	117	142	140	101	10×8×5 310 g.	25×15×6.5 1193.5 g.	11.5×7×3×2 139.5 g.	18×3.2×2 77.5 g.	25×13×5.5 822.5 g.	24×16×5.5 589 g.	11.5×5×2.5 108.5 g.	10.5×5.5×2.5 108.5 g.	9
3586	M.	24	5 9½	152	169	150	110	12×12×13 403 g.	35×20×8 1860 g.	11×8×3 140 g.	17×3×2 155 g.	23×13×7 744 g.	22×15×9 1008 g.	12×6×3.5 186 g.	12×6×3.5 186 g.	12
3633	M.	25	N. R.	N. R.	N. R.	N. R.	N. R.	10×9×6 326 g.	28×20×8 2759 g.	10×7×4 140 g.	20×5×2.25×4 109 g.	26×21×5 1070 g.	23×13×5.5 687 g.	11.5×5×3.75 171 g.	11.5×5×3.75 171 g.	12
3670	M.	35	5 9	159	141	135	117	14×11.5×5 357 g.	28×16.5×8 2031 g.	12.5×7.5×2.5 155 g.	N. R.	25×14.5×9 1008 g.	27×16×7 1007 g.	12.5×6.75×3 233 g.	12.5×6.75×3 233 g.	4
3697	F.	37	5	118	N. R.	N. R.	N. R.	26.5×18×6.5 1420 g.	26.5×18×6.5 1420 g.	14×8×2.5 263.5 g.	14×5×2 93 g.	21×14×6 728.5 g.	21×14×7 620 g.	8.5×3.5×2 108.5 g.	9×4×2.5 108.5 g.	8
3699	M.	14	4 8	N. R.	63	60	64	22×17×8 713 g.	22×17×8 713 g.	14×7.5×11.5 263.5 g.	16×4×3 166 g.	19×11×5.5 465 g.	20×14×7.5 465 g.	11.5×5×3 139.5 g.	11×6×4 124 g.	9
3708	M.	21	N. R.	N. R.	132	130	N. R.	20×20×7 186 g.	20×20×7 186 g.	14×9×4 271 g.	14×3×2 108.5 g.	7×14×22 961 g.	7×14×22 961 g.	14×5×3.5 217 g.	14×5×3.5 217 g.	N. R.
3740	F.	18	5 2½	116	135	135	N. R.	8.5×8×3.5 1488 g.	26×16×8 1488 g.	10×5.5×6.25 109 g.	14×3×2 124 g.	21×13×6 837 g.	22×11×6.5 744 g.	12×6×4 139.5 g.	11×6×3 124 g.	N. R.

N. R. stands for not recorded.
The normal weight is calculated from the height and age according to the New York Life Insurance Company's standard table.
The measurements of the organs are in centimeters.

The pictures here drawn are not intended to obscure the conditions which may be back of the invasion and early growth of the tubercle bacillus within the tissues, and which are without distinctive morphological changes, nor are they drawn to belittle the effects of the invasion of other micro-organisms which produce mixed infection, or of the toxins elaborated by the tubercle bacillus and the micro-organisms of the mixed infections, which react upon the organs and tissues in general and not specifically, but simply to emphasize the widespread anatomical lesions found in the various organs of the chronic pulmonary tuberculous at autopsy.

In a minority of the cases coming to autopsy the tuberculous process is not extensive, especially when compared with the two classes of cases mentioned above, and the secondary changes in the organs, though present, are not marked.

What is the cause of death in these cases? Loss of blood from a sudden profuse hemorrhage, intense toxemia from acute infection, and low resistance account for some, but in others the autopsy or the clinical history does not reveal the cause of death.

On pages 154, 155, and 156 we present a pretty complete table of the measurement and weight of the body and organs compared with the standard weight of the body for the height and age. The body weight of each case has been taken from the clinical history, *i. e.*, the highest weight and average weight from the statement of the patient and the last weight from the weight record on the clinical chart.

It has not been possible to systematically weigh each organ in every case, as numerous specimens were preserved for museum purposes, usually with some anatomical parts attached which would have prevented accurate weighing. In a few other cases some weights were not recorded. For comparing the weight of the individual with the standard normal weight the weight scale of the New York Life Insurance Company (usually called the "Nylic Standard") has been used.

EXTERNAL APPEARANCES AND GENERAL CONSIDERATIONS.

EMACIATION.

Emaciation was recorded as...	None,.....	16	} Out of 57 cases
	Some,.....	27	
	Marked,.....	10	
	Extreme,.....	4	

SUMMARY FOR THREE YEARS.

Emaciation was recorded as...	None,.....	36	} Out of 200 cases
	Some,.....	80	
	Marked,.....	66	
	Extreme,.....	16	
	Not recorded,.....	2	

Emaciation of varying degree is considered a prominent symptom of advanced pulmonary tuberculosis. In the fifty-seven cases of pulmonary tuberculosis autopsied it was noted present in a slight degree in 47.4 %; in a marked degree in 17.5%; in an extreme degree in 7.0%; and the absence of emaciation was noted in 28.0% of the cases.

In the Second Annual Report the impression was stated that favorable surroundings and good feeding kept the patient well nourished even to the time of death, and that the more emaciated the case at autopsy, the shorter the time, on an average, the case had been in the hospital. Statistics, however, for this year show that this impression is not true. The following table shows the condition at autopsy and the average stay of these patients in the hospital:

CONDITION AT AUTOPSY.	NUMBER OF PATIENTS.	AVERAGE NUMBER OF DAYS IN HOSPITAL.
Marked emaciation, ...	10	135
Emaciation,.....	21	68
Moderate emaciation,.....	9	75
Slight emaciation,.....	4	5
Well nourished,.....	13	64

It would appear, therefore, that it was not the length of time the patient remained in the hospital that made the difference between emaciation and non-emaciation, but the acuteness of the disease; in other words, the more acute and rapid the course, the less time for emaciation.

SUBCUTANEOUS FAT OF ABDOMINAL AND THORACIC WALLS.

Subcutaneous fat was recorded as.....	{	Normal,.....	27	} Out of 57 cases
		Increased,.....	2	
		Diminished,.....	28	

SUMMARY FOR THREE YEARS.

Subcutaneous fat was recorded as	{	Normal,.....	52	} Out of 200 cases
		Increased,.....	3	
		Diminished,.....	134	
		No record,.....	11	

The table on the amount of subcutaneous fat is of special interest in comparison with the table on emaciation. The body may show a more or less marked degree of emaciation, while the subcutaneous fat over the abdomen may still be fairly well preserved. This is less marked in the chest wall. In the present series the fat over the abdomen was recorded as normal in 47.4% of the cases, increased in 3.5%, and decreased in 49.1%.

CYANOSIS AND EDEMA.

Cyanosis in lips,.....	{	None,.....	33	} Out of 57 cases
		Slight,.....	21	
		Marked,.....	3	
Cyanosis in finger-tips, ...	{	None,.....	24	} Out of 57 cases
		Slight,.....	28	
		Marked,.....	5	
Cyanosis in face,.....		Marked,.....	1	Out of 57 cases
Edema of the ankles or legs, ...	{	None,.....	46	} Out of 57 cases
		Slight,.....	8	
		Marked,.....	3	

BEDSORES.

Number of cases with bedsores,..... 7 out of 57 cases

SUMMARY FOR THREE YEARS.

Number of cases with bedsores,.....20 out of 200 cases

Bedsore were noted in seven, or in 12.3% of the cases.

POSITION OF BODY VISCERA.

Abdomen,.....	{	Normal position of viscera,...	43	} Out of 57 cases
		Abnormal position of viscera,.	14	
Thorax,.....	{	Normal position of viscera,...	42	} Out of 57 cases
		Abnormal position of viscera,.	15	
Pelvic viscera,.....	{	Normal position of viscera,...	50	} Out of 57 cases
		Abnormal position of viscera,.	7	

The position of the abdominal viscera was abnormal in 24.5% of the cases. The malpositions were ptosis of the stomach, of the transverse colon, and of both. In the extreme cases the stomach was on the level with the umbilicus or slightly below and the transverse colon midway between the umbilicus and symphysis pubis or even nearer the pubic bone.

The ptosis of the stomach was not always associated with extreme emaciation in the individual nor with an enlarged stomach. With ptosis, the general long axis of the stomach became lower on the right side. The ptosis of the transverse colon was not accompanied by any gross pathological changes in the organ. The mesentery, of course, was longer than usual. Besides these organs the kidneys were displaced in a few cases, and the liver was noted lower in one case.

The position of the thoracic viscera was noted as being abnormal in 26.3% of the cases. The majority of the abnormal positions related to the heart and resulted from lesions in one or the other pleura or lung, whereby the heart was pushed or drawn to one or the other side, or from some change in the heart or pericardium.

HEIGHT OF DIAPHRAGM.

In fifty-four out of the fifty-seven cases autopsied the position of the vault of the diaphragm was noted in relation to the anterior chest wall and was recorded as follows:

<i>Right.</i> Number of Cases.		<i>Left.</i> Number of Cases.
2.....	3d Interspace.....	1
5.....	4th Rib.....	6
12.....	4th Interspace.....	7
23.....	5th Rib.....	18
7.....	5th Interspace.....	10
2.....	6th Rib.....	9
1.....	6th Interspace.....	1
2.....	7th Rib.....	2

The above table shows that in the great majority of cases the vault of the diaphragm is at the fifth rib on both sides, with next in frequency the fourth interspace on the right and the fifth interspace on the left.

The pressure of the liver on the diaphragm from distention of the stomach and intestines when the body is in the recumbent position must have much to do with the position of this muscle. In the normal anatomical relations the apex of the heart and pericardium rest more upon the left vault of the diaphragm than on the right, and the left vault of the diaphragm is narrower in front and from 2 to 3 cm. less in height than the right, thus explaining in part the lower position of the diaphragm on the left.

Moreover, in chronic pulmonary tuberculosis the lower lobe of the right lung is usually less involved than the lower lobe of the left, and is, therefore, more easily collapsed, and less resistant to upward pressure than if it were consolidated. These factors, together with the normal anatomical relations, probably aid in causing the higher position on the right. The position of the diaphragm was especially noted low in such conditions as pneumothorax and pyothorax.

PERICARDIUM.

In this year's work the pericardium was normal in all fifty-seven cases autopsied and milk spots were found but four times.

Subpericardial adipose tissue, .	{	Normal,.....	18	} Out of 57 cases.
		Slight,.....	25	
		Absent,.....	9	
		Excessive,.....	3	
		Not recorded,.....	2	
Fluid in the pericardium was recorded as	{	Normal,.....	28	} Out of 57 cases
		Slight increase,.....	4	
		Excessive,.....	22	
		Clear blood,.....	1	
		Not recorded,.....	2	

SUMMARY FOR THREE YEARS.

Pericardium,.....	{	Normal,.....	143	} Out of 200 cases
		Local adhesions,.....	3	
		General adhesions,.....	2	
		Obliterated,.....	8	
		Thickened,.....	1	
		Miliary tubercles,.....	3	
Fluid in the pericardium was recorded as	{	Not recorded,.....	40	} Out of 200 cases
		Normal,.....	52	
		Slight increase,.....	4	
		Excessive,.....	50	
		Clear blood,.....	1	
		Not recorded,.....	93	

The number of negative findings in regard to the pericardium in this series of fifty-seven cases of pulmonary tuberculosis is remarkable, yet it only substantiates the well-known fact that tuberculosis of the pericardium is rare. Our negative findings for this year are, however, greater than those usually found. In the two hundred cases autopsied in the last three years in the Institute, only three cases (1.5%) showing miliary tubercles of the pericardium have been recorded. In the three years milk spots were found thirty-two times.

No case of total obliteration of the pericardium, which is usually the result of a chronic fibroid pericarditis, was observed in the fifty-seven cases of this year. In the autopsies of three years it has been noted in eight cases (4%). These were all apparently of the simple adhesive type except one. This one was of the tuberculous adhesive type, in which the two layers of the pericardium become greatly thickened by an overgrowth of callus-like connective tissue, containing caseous areas.

The origin of the simple adhesive type of pericarditis in a tuberculous subject, without evidence of focal tuberculosis anywhere within the pericardium, is difficult to determine. That these cases are always of tuberculous origin would be unfair to presume from the autopsy findings. Similar conditions are found in cases dying of other causes in which there is no demonstrable tuberculosis. Nevertheless a pericarditis, coming on insidiously and without demonstrable cause, has been found to be tuberculous in a very high percentage of cases, and though this adhesive type may result from such a former tuberculous infection it is difficult to imagine that the process can heal so completely that no evidence of tuberculous origin is left.

The pericardial fluid in the autopsies of the past year was clear, slightly yellowish in color, at times containing flocculi of lymph, and varied in amount from a few cubic centimeters to 180 c.c. In the larger amounts it was of the nature of a transudate, and was in all likelihood of agonal origin.

HEART.

Color of muscle was recorded as	Normal,.....	26	} Out of 57 cases
	Pale,.....	29	
	Dark,.....	2	
Consistency of muscle was recorded as	Firm,.....	41	} Out of 57 cases
	Soft,.....	16	
Condition was recorded as	Hypertrophy of both ventricles,.....	3	} Out of 57 cases
	Dilatation of both ventricles,.....	9	
	Dilatation of right ventricle,.....	3	
	Dilatation of left ventricle,.....	1	
	Dilatation of both auricles,.....	3	
	Dilatation of right auricle,.....	4	
Valves were recorded as	Dilatation and hypertrophy,.....	1	} Out of 57 cases
	Normal,.....	46	
	Mitral thickened,.....	7	
	Mitral atheromatous,.....	4	
	Aortic atheromatous,.....	1	
	Aortic thickened,.....	1	
	Mitral stenosis,.....	2	
	Tricuspid dilated (excessive),.....	2	

SUMMARY FOR THREE YEARS.

Color of muscle was recorded as	Normal,.....	40	} Out of 200 cases
	Pale,.....	57	
	Dark,.....	3	
	No record,.....	100	
Consistency of muscle was recorded as	Firm,.....	51	} Out of 200 cases
	Soft,.....	47	
	No record,.....	102	
Condition was recorded as	Hypertrophy of both ventricles,.....	5	} Out of 200 cases
	Hypertrophy of left ventricle,.....	6	
	Hypertrophy of right ventricle,.....	2	
	Dilatation of both ventricles,.....	15	
	Dilatation of right ventricle,.....	22	
	Dilatation of left ventricle,.....	2	
	Dilatation of both auricles,.....	3	
	Dilatation of right auricle,.....	4	
Valves were recorded as	Dilatation and hypertrophy,.....	2	} Out of 200 cases
	Normal,.....	98	
	Mitral thickened,.....	15	
	Mitral atheromatous,.....	12	
	Mitral and aortic thickened,.....	3	
	Aortic dilated,.....	2	
	Aortic atheromatous,.....	3	
	Aortic thickened,.....	8	
	Aortic stenosis,.....	2	
	Aortic vegetations,.....	2	
	Tricuspid dilated (excessive),.....	2	
	Mitral stenosis,.....	2	
	No record,.....	51	

The condition of the heart is of special interest in association with chronic pulmonary tuberculosis because of the often quoted

antagonism of "heart disease" and pulmonary lesions. The heart at autopsy was generally found to be in diastole, with the chambers filled with blood either in currant-jelly or chicken-fat clots or both. The color varied from what was included within wide ranges as normal to distinctly pale. The consistency of the muscle was most frequently of normal firmness.

The valve leaflets were organically normal in 80.7% of the cases. In the remaining 19.3% the lesions found in the valves were of a chronic nature. The mitral valve leaflets showed a general thickening in seven cases and small atheromatous plaques, generally situated at the base of the anterior leaflet, in four cases. In only two of these cases did the general thickening of the valve result in distinct stenosis. In these two cases the process was the result of a former endocarditis of an inflammatory nature, while in the remaining cases of thickening of the valve leaflet it was probably part of a general fibroid condition, and did not, as far as could be detected, produce either a regurgitation or stenosis of the valve.

When noted diseased the aortic valve was generally thickened, and in one case contained small areas of calcification. In three cases, two of general thickening of the mitral and one of the aortic valve, where distinct changes causing loss of function were evident, the tuberculous process in the lungs and the body generally did not materially differ in extensiveness or in the type of lesion from what was generally found in other cases.

In the last days of life and at autopsy in a few cases evidence of a failing circulation was noted in cyanosis of the finger-tips or lips, by an occasional edema of the dependent parts of the body, and internally by passive congestion of the organs and varying amounts of transudates in the various body cavities. Slighter signs of failure of the circulation in the agonal period were noted in a higher percentage of cases than tabulated at the autopsy table. This explains, in part at least, the numerous cases of congestion of the liver and of the spleen.

HISTOLOGY OF THE HEART MUSCLE.

The heart muscle was studied histologically in forty-seven out of fifty-seven cases autopsied. The record is as follows:

Microscopically the heart muscle was recorded as	Normal,.....	12	} Out of 47 cases
	Congested,.....	2	
	Hypertrophy of the muscle nuclei,.....	33	
	Brown induration of the muscle cell,.....	7	
	Increase of intra-muscular fibrous tissue (interstitial myocarditis),.....	11	

In the great majority if not in all cases coming to autopsy from various causes the microscopic examination of the heart muscle shows varying numbers of hypertrophied muscle cells and nuclei, therefore it was only in cases showing a large number of such cells that a special note was made of the condition. In 70.2% of the cases examined microscopically this lesion was noted. This change in the heart muscle is undoubtedly the result of an increased physiological demand upon the heart's action brought about chiefly by the condition of the lungs.

Interstitial myocarditis, increase in the intra-muscular connective tissue, was noted in 23.5% of the cases; it was of a mild grade and noted only in the microscopic sections.

No lesion immediately referable to the tubercle bacillus, like miliary tubercles, was noted in the gross or microscopic examinations of the heart muscle. The heart muscle, as well as other muscles of the body, manifests a particular immunity against the invasion of the tubercle bacillus, and it is in only the exceptional case that a typical tuberculous lesion is found.

LARGER VESSELS.

The pulmonary vessels were recorded as normal in 100% of the cases.

The aorta was recorded as normal in twenty-nine cases (50.8%). In the remaining 49.2% atheromatous patches of varying size and shape were noted. The great majority of these were small and

either linear or rounded in outline. Extensive calcification was noted in no case.

Though the absence of calcified areas in the aorta may be explained in part by the age of the majority of the patients, their absence in a number of cases above fifty years becomes of special interest, because in the same class of patients dying of other causes such lesions are almost always found.

PLEURA.

Normal.....	{	Left.....		6
		Right.....		5
Adhesions were recorded as,...	{	Extreme apex,	None,.....	11
			Recent,.....	1
			Recent posteriorly,.....	1
			Old, location not definable,.....	17
			Old, anteriorly,.....	2
			Old, posteriorly,.....	3
			Obliterating,.....	22
			None,.....	6
			Recent,.....	1
			Recent, posteriorly,.....	1
		Right,	Old, location not definable,.....	16
			Old, anteriorly,.....	1
			Old, posteriorly,.....	5
			Obliterating,.....	23
			Old and recent,.....	1
			Thickened,.....	2
			Thickened, old,.....	1
			None,.....	9
			Localized, old,.....	22
			Obliterating,.....	22
		Rest of upper lobe,.....	Recent,.....	2
			Localized, recent,.....	1
			General, old,.....	1
			None,.....	8
			Localized, old,.....	18
			Obliterating,.....	23
			Recent and old,.....	1
			Localized, recent and old,.....	1
			Recent,.....	1
			Localized, recent,.....	1
		Middle lobe, .. Right,	Pyothorax,.....	3
			Pyopneumothorax,.....	1
			None,.....	22
			Localized, old,.....	4
			Obliterating,.....	23
			Recent,.....	1
			Recent and old,.....	1
			Old,.....	1
			Pyothorax,.....	4
			Pyopneumothorax,.....	1

Out of
57
cases

Adhesions were recorded as, ... Lower lobe, ...	Left, ...	None, ...	21	Out of 57 cases
		Localized, old, ...	11	
		Obliterating, ...	22	
		Localized, recent, ...	1	
		Localized, recent and old, ..	1	
		Pyothorax, ...	1	
	Right, ...	None, ...	21	
		Localized, old, ...	6	
		Obliterating, ...	23	
		Recent, ...	1	
		Old, ...	2	
		Pyothorax, ...	3	
Exudate, ...	Pleura, left lung, ...	Pyopneumothorax, ...	1	
		Normal, ...	26	
		Increased, ...	5	
		Purulent, ...	2	
		Sacculated, ...	2	
		None (pleura obliterated),	22	
	Pleura, right lung, ...	Normal, ...	26	
		Increased, ...	1	
		Purulent, ...	4	
		Bloody, ...	1	
		Sacculated, ...	1	
		Edema, *	1	
		None (pleura obliterated),	23	

* Case of obliterated pleura with edema of the adhesions.

SUMMARY FOR THREE YEARS.

Normal,.....	{	Left,.....		11		
		Right,.....		10		
			None,.....	16		
			Recent,.....	7		
			Recent, posteriorly,.....	1		
		{	Left,..	Old, location not definable,.....	41	
				Old, anteriorly,.....	2	
				Old, posteriorly,.....	3	
				Obliterating,.....	59	
				No record,.....	71	
	{	Extreme apex, ...	{	None,.....	11	
				Recent,.....	1	
				Old, posteriorly,.....	1	
				Old, location not definable,.....	34	
				Old, anteriorly,.....	1	
			{	Right,	Old, posteriorly,.....	5
					Obliterating, ...	54
					Old and recent,.....	3
					Thickened, ...	2
					Thickened, old,.....	1
					No record, ...	87
			{	None,.....	14	
				Localized, old,.....	44	
				Obliterating,.....	59	
				Recent,.....	9	
				Localized, recent,.....	1	
				General, old,.....	1	
				Pyothorax,.....	3	
				Pyopneumothorax,.....	5	
				Pneumothorax,.....	1	
				No record,.....	63	
Adhesions were recorded as,...	{	Rest of upper lobe, .. Left,...			Out of 200 cases	

Adhesions were recorded as, ..	Rest of upper lobe, .. Right,	None,.....	13	Out of 200 cases
		Localized, old,.....	34	
		Obliterating,.....	54	
		Recent and old, ...	2	
		Localized, recent and old, ..	1	
		Recent,.....	4	
		Localized, recent,.....	1	
		Pyothorax,.....	9	
		Pyopneumothorax,.....	6	
		Pneumothorax,.....	4	
	Middle lobe, .. Right,	No record, ...	72	
		None,.....	27	
		Localized, old,.....	15	
		Obliterating,.....	54	
		Recent,.....	3	
		Recent and old, ...	1	
		Old,.....	1	
		Pyothorax,.....	10	
		Pyopneumothorax,.....	6	
		Pneumothorax,.....	4	
	Lower lobe, ..	No record,.....	79	
		None,.....	26	
		Localized, old,.....	58	
		Obliterating,.....	59	
		Localized, recent,.....	12	
		Localized, recent and old, ..	5	
		Pyothorax,.....	4	
		Pyopneumothorax,.....	5	
		Pneumothorax, ...	1	
		No record,.....	30	
Exudate, ...	Left, ..	None,.....	26	
		Localized, old,.....	15	
		Obliterating,.....	54	
		Recent,.....	6	
		Old,.....	35	
	Right,	Pyothorax,.....	9	
		Pyopneumothorax,.....	6	
		Pneumothorax,.....	4	
		No record,.....	45	
	Pleura, left lung,.....	Normal,.....	37	
		Increased,.....	13	
		Purulent,.....	10	
		Sacculated,.....	2	
		No record,.....	138	
	Pleura, right lung,.....	Normal,.....	36	
		Increased,.....	15	
		Purulent,.....	13	
		Bloody,.....	1	
		Sacculated,.....	2	
		Edema,.....	1	
		Calcified,.....	1	
		No record, ...	131	

The pleurisies encountered in the autopsies of the past year may be divided into the following types:

1. Localized chronic fibroid pleurisy.

2. Obliterating chronic fibroid pleurisy.
3. General recent and old fibroid pleurisy.
4. Acute purulent pleurisy.
5. Sacculated or encysted pleurisy.

1. *Localized Chronic Fibroid Pleurisy*.—Pleurisy of this type was localized to one part of a lobe, to a whole lobe, or to irregular areas distributed over several lobes of the lung, with or without adhesions between the two layers. The fibroid changes in this form of pleurisy were generally of a dense nature, and at times the two surfaces of the pleura were so firmly united that it was necessary to strip the parietal pleura from the chest wall in order to remove the lung from its pleural cavity. In other cases where the two layers of the pleura were not firmly united, fibrous bands of varying lengths and widths were present. The length of these adhesions is probably determined by the lung play within the pleural cavity during the respiratory excursion or paroxysms of coughing on the one hand, and by contraction and loss of lung play from consolidation of the lung on the other. In some cases they varied from 2 to 4 cm. in length. In the great majority of these cases the adhesions were so dense and strong that it does not seem possible for their length to have been determined by the partial collapse of the spongy lung after death and the opening of the thoracic cavity.

Diaphragmatic pleurisy was noted in a number of cases. Adhesions between the base of the lung and the diaphragm were less frequently found than local adhesions elsewhere.

Interlobar pleurisy: The partial or complete obliteration of the interlobar space by the adhesion of the two pleural surfaces is rather the rule than the exception in chronic tuberculosis of the lungs. In these cases the boundary of the lobes is marked by a connective-tissue septum varying from a line to a band 2 to 5 mm. or more in thickness. This fibrous band may show typical tuberculous deposits, or consist solely of old connective tissue. In other instances the two surfaces are united by loose or isolated bands of adhesions of varying length.

It is interesting to note in the accompanying table the distribution of these adhesions over the apices and separate lobes of the two lungs. It will be seen that the extreme apex of the left lung was free from adhesions in 19.3% of the cases; while the apex of the right lung was free in only 10.5%. The rest of the upper lobe of the left lung was free from adhesions in 15.8% of the cases, and the right lung in 14%. The pleura over the middle lobe of the right lung was normal in 38.6% of the cases. The lower lobe of the left and of the right lung was free in the same number, or 38.6% of the cases. In other words, the right apex was normal less frequently than the left, while the remainder of the two lungs practically corresponded.

Comparison of the adhesions over both lungs shows the following interesting distribution: Old general adhesions were present at the left apex in 38.5% of the cases; of this number 9% were more or less localized anteriorly, while 14% were localized posteriorly and the remainder were general. Old general adhesions were noted at the right apex in 45.6% of the cases, and of these 3.4% were situated more or less anteriorly, while 19.1% were situated posteriorly, the remainder being general. Over the rest of the upper lobes the left showed localized or general adhesions in 40.3% of cases, the right in 35%.

The number of cases is entirely too small to draw broad conclusions. In these cases, however, the lesions of the pleura were found more frequently at the apex posteriorly on the right side than on the left, and on both sides more frequently posteriorly than anteriorly.

The number of adhesions over the middle lobe of the right lung and the lower lobes of both lungs is decidedly less than over the upper lobes, and especially the apices. In other words, the process in the pleura appears to start more frequently over the upper lobe, and especially the apex posteriorly, and less frequently as we approach the base of the lung. This idea is confirmed by the findings in the lungs. If a conclusion can be drawn from these cases it

would be that the tuberculous process with an accompanying pleurisy usually starts on the right side posteriorly in the region of the apex.

2. *Obliterating Chronic Fibroid Pleurisy*.—Of this year's cases only those have been included in this class which showed a complete obliteration of the whole pleural cavity. A comparison of the two sides of the chest is of value. Obliteration of the left pleural cavity was noted in 38.6%, and of the right in 40.4% of the cases. Of these, 19.3% showed obliteration on both sides.

It is of interest to note that the immediate underlying lung tissue in these cases of obliterated pleura did not show corresponding pathological changes. In some areas a superficial cavity with great thickening of the visceral pleura was noted, in others caseous pneumonia or a bronchopneumonia, and yet elsewhere, especially at the bases of the lungs, there was normal lung tissue directly beneath the adherent surfaces of the pleura.

Judging from these conditions of the underlying lung tissue, it would seem that the obliterated pleura was the result of a process more or less confined to the pleural cavity. It may have resulted from an early pleurisy, either tuberculous or of other origin, and, like a similar condition in the pericardium, the true cause of the condition must, in a certain percentage of the cases, remain in doubt.

If the process results from repeated injuries to the pleura from localized processes in the lung directly beneath the visceral layer, it must extend far from the original point of irritation, because, as stated above, the obliterating process in many instances had normal lung tissue directly beneath it. In the second place, if this were the manner of origin, the finding of denser bands with more recent adhesions would be the rule and not the exception. It does seem, therefore, that these oblitative pleurisies are the result of a general condition of the pleura and not the result of repeated localized pleurisies.

3. *General Recent and Old Fibroid Pleurisy*.—This item has

crept into the autopsy records from the actual findings at the autopsy table. As the term implies, there are found throughout the pleural cavity over one or more lobes areas of old dense and of recent adhesions. The presence of the old and recent adhesions suggests the way the process becomes widespread. It is likely that the isolated adhesions found at autopsy represent repeated injuries to the pleura from localized conditions in the lungs. In these cases, even when the adhesions are distributed throughout almost the whole pleura, small areas of practically normal pleura are to be found. Moreover, the two surfaces of the pleura are not (even when the adhesions are numerous) so closely approximated as in a case of obliterated pleura.

4. *Acute Purulent Pleurisy (Pyothorax or Empyema).*—Accumulations of pus in the pleural cavity in cases of chronic pulmonary tuberculosis generally result from and follow closely upon a pneumothorax. The entrance of air into the pleural cavity is generally due to the rupture of a cavity. Air from the lung and the contents of the cavity—muco-pus with tubercle bacilli and other organisms—are emptied into the pleura. The lung becomes collapsed and generally retracts to the posterior part of the pleural cavity, where it is usually found post-mortem, airless, compact, and generally covered with a fibrinous or purulent exudate. Sometimes, however, if there have existed previous to the pneumothorax scattered dense bands of adhesions between the chest wall and the lung, the complete retraction of the lung is prevented and the lung becomes irregular in shape owing to the traction of the fibrous adhesions. These bands of adhesions may be found bridging the pleural cavity in one or more places. In these cases, though greatly contracted, the lungs still contain quite considerable air. This is especially true when the fluid does not occupy the whole pleural cavity. The formation of pus in the pleural cavity after such an accident is generally caused by one or several of the pyogenic organisms, most frequently the streptococcus pyogenes or the staphylococcus pyogenes aureus.

Later developments show that the air within the cavity is rapidly absorbed and an increasing amount of purulent fluid takes its place.

The purulent fluid as found post-mortem may occupy the whole of the cavity or only a part of it. It varies from a thin, slightly cloudy, watery fluid of a yellow to a yellow-green color to a thick pus. The bacterial contents of the fluid vary with the nature of the mixed infection in the cavity of the lung. In old empyemata the pus may be sterile.

In old cases both pleural surfaces generally become greatly thickened from an overgrowth of fibrous and granulation tissue, and with subsequent healing the complete organization of this tissue into fibrous tissue completely or at least partially prevents expansion of the collapsed lung. In the great majority of cases, however, the tuberculous process in the lung is so far advanced when the empyema develops that the individual readily succumbs to the added injury, and dies immediately from shock or from the effects of the empyema.

5. *Sacculated or Encysted Pleurisy*.—This form of pleurisy may be of either the purulent or the serous type. It may occur in a pleura the seat of an old fibrous pleurisy, in which the collection of pus or of serum accumulates between the old adhesions, or it may arise from a local irritation or infection and the adhesions form as a walling-in process. At autopsy the collection of pus, or rarely of pure serum, is found surrounded by a dense wall of adhesions which localize the process to one part of the pleural cavity. Beyond these bands of adhesions the pleura may be normal, although old scattered or general adhesions are usually present.

In the fifty-seven cases two cases of encysted pleurisy were found on the left side and one on the right. Of the former, one contained 100 c.c. of clear fluid, the other 300 c.c. of purulent fluid; the one on the right contained about 200 c.c. of purulent fluid. In the two hundred autopsies for the past three years only four sacculated pleurisies have been noted.

LUNGS.

		<i>Left.</i>	<i>Right.</i>
Upper lobe,...	Apex,....	24 cavities, large,.....25 9 cavities, small,.....5 3 cavities, communicating,.....4 0 cavities, small and numerous,.....1 31 cavities, large,.....27 10 cavities, small,.....9 1 cavities, small and numerous,.....3 14 cavities, communicating,.....13 1 cavities, large and small,.....0 12 fibroid,.....13 4 miliary tubercles, few,.....8 16 miliary tubercles, many,.....14 2 miliary tubercles, coalesced, few,...1 9 miliary tubercles, coalesced, many,..11 15 bronchopneumonia,.....22 25 broncho-caseous pneumonia,.....23 1 healed lesions,.....0 2 collapsed,.....3 4 edema,.....6 1 anthracosis,.....3 3 emphysema,.....2 13 bronchial walls, normal,.....16 44 bronchial walls, thickened,.....41 6 bronchial walls, dilated,.....6	
	Rest of upper lobe,....		
Middle lobe,....		Cavities, large,.....7 Cavities, small,.....3 Cavities, communicating,.....7 Cavities, small and numerous,.....1 Fibroid,.....2 Miliary tubercles, few,.....14 Miliary tubercles, many,.....14 Miliary tubercles, coalesced, few,.....4 Miliary tubercles, coalesced, many,.....12 Bronchopneumonia,.....20 Broncho-caseous pneumonia,.....21 Collapsed,.....3 Edema,.....11 Anthracosis.....2 Emphysema,.....5 Bronchial walls normal,.....24 Bronchial walls thickened,.....33 Bronchial walls dilated,.....4	
		<i>Left.</i>	<i>Right.</i>
	Lower lobe, ...	10 cavities, large,.....8 4 cavities, small,.....5 7 cavities, communicating,.....5 2 cavities, small and numerous,.....3 5 fibroid,.....1 15 miliary tubercles, few,.....21 17 miliary tubercles, many,.....15 3 miliary tubercles, coalesced, few,.....5 19 miliary tubercles, coalesced, many,.....12 22 bronchopneumonia,.....20 24 broncho-caseous pneumonia,.....20 1 healed lesions,.....1	

Condition in
the 57 cases
autopsied
was record-
ed as,.....

Condition in the 57 cases autopsied was record- ed as,.....		Left.		Right.	
Lower lobe, ...	{	2	collapsed,.....	3	
		10	edema,.....	13	
		1	anthracosis,.....	2	
		1	gangrene,.....	0	
		3	emphysema,.....	2	
		23	bronchial walls, normal,.....	31	
		33	bronchial walls, thickened,.....	26	
		3	bronchial walls, dilated,.....	2	
		0	bronchial walls, tortuous,.....	2	

The pathological anatomy of tuberculosis of the lungs may be divided into the following types:

1. Acute miliary tuberculosis.
2. Caseous tuberculous pneumonia.
3. Tuberculous pneumonia or gelatinous pneumonia.
4. Caseous tuberculous bronchopneumonia.
5. Fibroid tuberculous pneumonia.
6. Chronic tuberculosis of the lungs with cavity formation.

1. *Acute Miliary Tuberculosis of the Lungs*.—This type of tuberculosis of the lungs may arise when numerous tubercle bacilli have gained entrance into the general circulation, and the process in the lungs is then only part of a general systemic infection, or it may originate from numerous bacilli getting into the lesser circulation, when the process remains more or less localized to the lung. In this latter class of cases the tubercle bacilli have gained entrance into the venous circulation and are for the most part filtered out in the capillaries of the lungs, where they produce numerous tubercles. The Institute sees this class of cases rarely.

2. *Caseous Tuberculous Pneumonia*.—Under this term are included the cases which for the most part run a rapid clinical course and at autopsy show a widespread pneumonic consolidation, usually completely caseated. These cases correspond to the clinical type of the disease known as phthisis florida. Anatomically considered, the greater part of one or both lungs shows extensive areas of caseous pneumonia, and it is not uncommon to find a whole lobe, or even the whole lung, converted into a caseous mass. In the late stages of this form of tuberculosis, especially

in those of a subacute course, cavity formation is generally present. The size of the cavity is relatively small as compared with cavities in the chronic form of pulmonary tuberculosis, and the walls do not show the usual fibroid construction of the latter. The cavities are frequently numerous and communicating, producing a honey-combed appearance over large areas. They have the appearance of being the result of acute softening. The caseous material is softer, moister, and of a greenish-yellow color, rather than the usual yellow color of caseous material. Mixed infection, especially with pus-producing organisms, is usually present, and may be responsible for the rapid course of the disease.

The process usually starts from an older lesion, which at time of autopsy may be difficult to differentiate from recently involved areas. In the fifty-seven cases no typical example of this form of caseous tuberculous pneumonia was observed. It was not uncommon, however, to observe large areas of caseous pneumonia which were surrounded by the usual picture of chronic tuberculosis. These are tabulated under the head of caseous tuberculous bronchopneumonia, and are described under that head.

3. *Tuberculous Pneumonia or Gelatinous Pneumonia*.—In the lungs of cases of pulmonary tuberculosis, varying sized areas of pneumonic consolidation of the lung tissue are at times observed, which have a slightly translucent character, are of a pale, yellow, gray to gray-yellow or green color, are of firm consistency, and are usually situated in the neighborhood of caseous bronchopneumonic areas. They are irregular in outline, and vary in size from that of the average English walnut to larger areas, at times involving the greater part of a lobe. On hasty examination the translucency looks to be due solely to an edematous condition, but section fails to demonstrate this. To this condition the name tuberculous pneumonia or gelatinous pneumonia has been given. It may be that it precedes or is the early stage of what appears later in the lung as caseous bronchopneumonia, or it may result, as has been suggested, from excessive toxic products from neighboring tuberculous foci.

Pneumonia of this type was found in the left upper lobe twice and left lower lobe three times. In the right lung it was found three times in the upper lobe, five times in the middle lobe, and five times in the lower lobe. In only two instances in the above cases was general edema of the lung observed.

4. *Caseous Tuberculous Bronchopneumonia*.—Under this term is described a type showing small and large irregular areas of caseation, usually the former. The process undoubtedly includes several lesions which have originated in various ways:

(a) By the formation of chronic miliary tubercles, especially when the lesion is large and the borders have become irregular.

(b) By the formation of large groups of peri-bronchial tubercles which have become caseous.

(c) By the formation of areas of bronchopneumonia, lobular pneumonia of tuberculous origin with caseation, probably the result of insufflation.

These areas stand out as striking changes next in prominence to areas of excavation on the section surface of the tuberculous lung. They vary in size and shape, are yellowish-white in color, are usually dry, are firm in consistency and on scraping the surface crumble, or are putty-like. In old chronic cases with excavations in which the lung lesions have rapidly progressed during the last few weeks of life, these caseous bronchopneumonic foci have more of a greenish hue, and are softer and more moist than in the average case. Mixed infections, and especially streptococci, may play an important rôle in these cases.

The borders of the caseous area are surrounded by a zone of gray, gray-red to red-gray infiltrated lung tissue, the active seat of the advancing process. Very frequently, in fact as a rule, several of these areas have fused together, making larger caseous masses. In the autopsies of this year such lesions were usually found in some part of every lung; only when they were particularly prominent, however, has special note been made of them.

It will be seen from the tables that these areas were more fre-

quently observed in the upper lobes, the seats of the most advanced tuberculous process, and less frequently in the lower lobes, especially toward the base of the lung.

5. *Fibroid Tuberculous Pneumonia*.—Under this term is described a tuberculous condition of the lung accompanied by a fibroid overgrowth which may reach extensive proportions. The condition is chronic, of much longer duration than the other lesions in chronic tuberculosis, and apparently occurs in individuals with great resistance to the tuberculous infection. When the fibroid condition is extensive, the lung is usually deformed, irregular in outline, lessened in elasticity, and very much harder in consistency than under other conditions.

Section through such a fibroid lung shows an irregular overgrowth of fibroid tissue containing small and large tuberculous foci. These tuberculous foci are usually of a caseating type and may be accompanied by areas of calcification. Smaller or larger cavities may be observed interlocked between the fibrous bands. Some of these cavities may be dilated bronchi, as bronchiectasis is rather commonly observed in this form of the disease. The remaining uninvolved lung tissue is usually emphysematous from overwork.

Fibroid tuberculous pneumonia is not a common condition in its pure form. Fibroid changes, or rather an increase of fibrous tissue, usually accompany to a greater or less degree the average case of chronic pulmonary tuberculosis; it was only when the process was strikingly localized to one part of a lobe, a whole lobe, or a lung that special mention was made of the condition in our records.

In the tables it will be seen that specially noted fibroid changes were observed in the left upper lobe in 21% of the cases; in the right upper lobe in 22.8%; in the middle lobe in only 3.5%; in the left lower lobe in 8.7%, and in the right lower lobe in 1.7%. These fibroid changes were most frequently found in the upper lobes, the early seat of chronic pulmonary tuberculosis. They not only indicate the chronicity of the case, but also nature's attempt to check the tuberculous process. In only one case, or

1.6%, were the fibroid changes sufficiently generally distributed to be considered as fibroid tuberculous pneumonia.

The cases distinguished by a marked degree of anthracosis occurred in coal miners, and consequently come under the heading of "coal miners' phthisis." In these cases of "coal miners' phthisis" the marked anthracosis was probably the primary factor in the formation of the fibrous tissue, as pneumoconiosis of whatever type is usually accompanied by an overgrowth of fibrous tissue.

6. *Chronic Tuberculosis of the Lungs with Cavity Formation.*—To this class belongs the great majority of the cases observed at the Institute. The tabulations of the autopsy findings of the cases show that it comprises various types of lesions, the extremes of which have been classified under the above different headings.

In the tables the different lesions were noted under the separate headings: "Cavities," "Bronchopneumonia," "Broncho-caseous pneumonia," "Fibroid," "Miliary tubercles few," "Miliary tubercles many," "Coalesced tubercles," etc., but when a combination of these lesions appeared in any one case, they were noted only when prominent. Had the lesions been sought for simply as lesions, they would probably have been found in almost every lung, but, as stated above, it was only when they presented a definite picture that they were especially noted. The most important of these lesions, especially those having a clinical significance, will here receive special notice under separate heads.

Cavity formation: In the localization of cavities the lungs have been divided into "apex," "rest of upper lobe," "middle lobe," and "lower lobe." The cavities themselves have been described as "large," "small," "large and numerous," "small and numerous," and "communicating" (chiefly small numerous cavities).

It will be seen from the table that the left lung showed cavity formation in the apex in 63.1% of the cases; of these, 66.6% were large cavities. The right lung showed cavity formation in the apex in 61.4% of the cases, and of these 71.3% were large cavities.

In the remainder of the upper lobe of the left lung cavities were noted in 100%; while in the remainder of the upper lobe of the right lung they were noted in 91.2% of the cases.

In the middle lobe cavities were noted in 31.5% of the cases, in the lower lobe of the left lung in 40.4%, and in the lower lobe of the right lung in 37%. In other words, the formation of cavities in the lungs was more common in the upper lobes than the lower, and slightly more common in the left lung than in the right.

The clinical charts showed cavity formation less frequently in the middle than in the lower lobe of the right lung, and this was borne out at the autopsy table. When cavities were found in the lower lobes they occurred usually in the posterior upper part of the lobe, where they were usually, although not always, contiguous to similar processes in the upper lobes. The cavities were generally irregular in outline and the walls usually showed fibroid changes and were surrounded by marked areas of infiltration. Along the walls, or bridging the cavities, could sometimes be seen thickened bronchi or blood-vessels. The cavities were usually partly filled with muco-pus, and the wall showed either a distinct pseudo-membrane, or was smooth and fibrous in character.

In the great majority of cases the lung tissue immediately surrounding the cavity showed a gray-red infiltrated zone or was distinctly caseous. This infiltrated zone or caseous material was in the majority of cases at least 1 cm. in thickness, or the remainder of the lobe, especially in the case of a large cavity, was completely consolidated. In a very few instances the wall of the cavity was bordered by a very narrow zone of infiltration, and beyond this air-bearing lung tissue.

Miliary tubercles: Under the general head of miliary tubercles the following tabulations have been made:

Miliary tubercles few.

Miliary tubercles many.

Miliary tubercles coalesced, few.

Miliary tubercles coalesced, many.

These separate headings have been made to show the distribution of the tuberculous process in its different types. The small gray or grayish-yellow tubercles were usually isolated from the more advanced tuberculous lesions such as occur in connection with fibroid changes and in the immediate vicinity of a tuberculous cavity. In other words, these tabulations show the isolated tubercles or small groups of tubercles occurring in areas of a lung not involved by the more extensive consolidations.

Coalesced tubercles: Under the head of coalesced tubercles were included all lesions consisting of groups of tubercles usually yellow-gray to distinctly yellow in color, and more or less isolated from distinctly tuberculous tissue. The class includes for the most part peri-bronchial tubercles and tubercles of lymphatic origin rather than of hematogenic origin.

As shown by the table, such groups of tubercles varied greatly in different parts of a lung. They were more often observed as distinct lesions in the lower lobes, where they appeared as nodular areas of varying size embedded in an otherwise fairly normal lung tissue. It will be seen by comparing the tables of the different lobes that the number of typical tubercles found increases toward the lower lobes. These early tubercles occurring in otherwise healthy lung tissue, in advanced cases of pulmonary tuberculosis show one of the methods of advance of the tuberculous process in the individual. These isolated tubercles, or small isolated groups of tubercles in an otherwise healthy part of the lung, may arise from four different sources:

1. The tubercle bacilli may be transported from old foci by way of the lymphatics. This mode of dissemination is the usual process when a tuberculous focus is distal to the normal direction of the flow of the lymph. In these cases the tubercle bacilli are deposited along the lymph-channels between the tuberculous focus and the larger draining lymphatics and the draining lymphatic glands.

In cases of chronic pulmonary tuberculosis in which advanced

lesions may be irregularly situated in regard to the lymphatic drain, we may consider a reversion of the direction of the flow of the lymph from the normal by means of which a circuitous route through anastomosing channels is established before the flow to the larger trunks is re-established. If this explanation be accepted, the deposit of tubercle bacilli along these newer routes may in part explain the distribution of some of the tubercles not otherwise accounted for.

The lymphatic dissemination of the tubercle bacillus explains only in part the wide distribution of the tubercles throughout the lungs in these cases.

2. The tubercle bacilli may be transported from an older original focus by way of the blood-vessels.

When tubercle bacilli gain entrance to the blood-current they are wafted along until filtered out by the tissues or ingested by phagocytes and carried to distant parts. In either case the bacilli, if not killed, find a favorable soil, and start in anew in the tissues the process which eventuates in the typical tubercles.

When the bacilli gain entrance to the general circulation they may be distributed throughout the organs and tissues of the body. When they gain entrance into the lesser pulmonary circulation by way of the lymphatics the great majority of them are filtered out in the lungs, and finding here a favorable soil, give rise eventually to new tubercles. No doubt, many of the tubercles found in otherwise healthy parts of the lungs originate in this way, as do also the tubercles in other organs. This mode of dissemination explains in part the numerous small so-called terminal tubercles found at autopsy in the various organs.

3. Insufflation of the tuberculous detritus from ulcerated tuberculous foci elsewhere in the respiratory tract is still another mode of dissemination.

One working at the autopsy table cannot help being impressed by the evidence of this mode of dissemination of tubercle bacilli and other organisms within the lungs. The whole respiratory

tract, the larynx, trachea, bronchi and their smaller ramifications show varying amounts of mucus or muco-pus which must be moved to a greater or less extent in two directions—out and in—during every act of respiration. True, the major part of this excretion containing the débris of areas of ulceration is removed entirely by expectoration; yet the act of coughing must nebulize a certain amount of the remainder and disseminate it deeper into uninvolved portions of the lungs, where new foci are thus established by the deposited micro-organisms.

It would be difficult to determine how many of the single isolated tubercles found everywhere in the lung have originated in this way. No doubt has ever been expressed, however, that many of the smaller or larger groups of isolated tubercles, especially those of the peri-bronchial type, have so originated. This mode of re-infection or dissemination in a case of ulcerative tuberculosis of the lungs may play a greater rôle than is usually accredited to it.

4. The methods of direct extension of the tuberculous process within the lung also require consideration, because more new tissue is probably involved by this means than by any other.

The miliary tubercle, single at first, soon gives rise to other tubercles at its periphery, these in turn to larger groups, and so on until large areas are involved. Since the process is usually multiple (as stated under the considerations of the dissemination of the tubercle bacillus), the multiple foci which are established grow larger and soon fuse into masses of tuberculous diseased tissue.

The growth of the process in a tuberculous lung by direct extension is very strikingly illustrated at the autopsy table by the frequency of the occurrence of the same process in adjacent parts of two lobes. This direct extension is most noticeable in the posterior part of the right lung, where, for example, a caseous pneumonia of the base of the upper lobe will be continuous with a similar process in the adjacent part of the lower lobe. Equally as striking in this connection is a continuation of a cavity from the

upper into the lower lobe, the process bridging the interlobar pleura, while the remainder of the lower lobe is to a certain degree in fairly good condition.

The process of direct extension of the original focus is equally well illustrated in that the multiplicity of lesions, the amount of involvement, the fibroid changes, etc., are greater in the upper lobe, the original site of the lesion, and less and less toward the base of the lower lobes. In other words, the remaining functioning lung tissue in the very great majority of the fifty-seven cases posted was situated in the lower part of the lower lobes, with a slight preference for the right lower lobe.

Other lesions of the lungs not tuberculous in nature, or at least not solely tuberculous, deserve also passing comment.

Bronchopneumonia: Under the head of bronchopneumonia have been included areas, usually isolated, of a deep red to gray-red color, of irregular outline, firm in consistency, on section, elevated above the section-surface as shown when the knife is scraped over the surface, and manifesting no evidence of tuberculosis. These areas are usually scattered through both lungs, and vary in size and number. In the upper lobe of the left lung bronchopneumonic areas were noted in 26.3% of the cases, and in the upper lobe of the right lung in 38.6%; in the middle lobe of the right lung in 35%; in the lower lobe of the left lung in 38.4%, and in the lower lobe of the right lung in 35%.

The majority of these lesions arise from secondary infection already present in cavities, the infected material being insufflated into healthy lung tissue. The bacteriological report (p. 216) shows the variety of organisms which have been found in these special lesions.

"Healed Lesions"; "Arrested Lesions": An old or "healed" focus of tuberculosis of the lungs is a rare finding at the Institute. The lesions grouped under this heading showed a dry, distinctly yellow, caseous center, rarely a fibroid center, with or without deposits of calcium, and surrounded by a capsule of fibroid tissue.

The lesions were usually small, and from one to three in number in a case.

It is not at all surprising that so few of these lesions were observed because the cases that succumb to tuberculosis often show so much destruction of tissue that all evidence of former healed lesions would have been destroyed. Besides many of the cases are either of the subacute or chronic progressive type and in neither is the healing process sufficiently active to produce distinct encapsulation of the lesion.

Emphysema: Only those cases showing a moderate or severe degree of emphysema were noted. Compensatory emphysema to a greater or less degree is present in the great majority of the cases during the late stages of the disease on account of the great involvement of the lungs. The chronic consumptive, however, does not show the marked emphysema so frequently seen in more acute lung diseases, because in the average consumptive the progress of the disease is comparatively slow, and, the general vitality of the patient becoming less with the advance in lung involvement, the requirements for lung space must necessarily be less than in more active life. Emphysema of the type that would most likely be present during the life of the average case at the Institute disappears at the time of autopsy. Few cases of typical emphysema were, therefore, observed.

Condition of the Bronchi: It is impossible to conceive of a marked tuberculous condition being present with an extensive pneumonia, fibroid changes, and cavity formation with its mixed infection without involvement of the walls of the bronchi, localized to that part; in considering the bronchi, therefore, the general rather than the local manifestations in each lobe were studied.

It will be seen by the tables that the walls of the bronchi were normal more often in the lower than in the upper lobes. In the latter they were more frequently thickened and dilated (bronchiectasis). These findings go hand in hand with the distribution of the tuberculous process in the lungs; still, bronchiectasis

(dilatation and thickening of the bronchial walls) as a general condition was not noted so frequently as it is generally supposed to exist in the chronic consumptive.

That the bronchi are undoubtedly avenues for the further dissemination of the tuberculous process in the lung tissue is evidenced by the great frequency of peri-bronchial tubercles. Many of the "coalesced tubercles" in our tables apparently arose from such a mode of infection. Localized bronchiectasis of various types is frequently observed. In these cases it no doubt results from disease of the wall of the bronchus produced either by the tuberculosis or a mixed infection. The diseased walls becoming weakened by ulcerating processes are subject to dilatation by the spasmodic or forced acts of respiration so frequent during the course of the disease. Ulcerations of the larger bronchi were noted in a number of cases.

LARYNX.

Larynx was recorded as ...	{	Normal,.....	26	} Out of 51 cases
		Infiltrated,.....	1	
		Congested,.....	5	
		Congested and ulcerated,.....	5	
		Ulcerated,.....	11	
		Ulcerated with general infiltration,	3	

Tuberculosis of the larynx is a frequent complication of chronic pulmonary tuberculosis in the late stages of the disease. The repeated irritation of the organ from coughing, and the fact that it is almost continuously bathed in a bacterial emulsion containing tubercle bacilli and other micro-organisms, makes it particularly liable to infection. The above table gives the macroscopic appearances of the organ at the autopsy only.

Two distinct types of tuberculous lesions were noted, namely, infiltration and ulceration. Infiltration was noted chiefly at the base of the epiglottis, and frequently, although less commonly, along the cords. This infiltration consisted of a general or localized thickening with slight granulation upon the surface. This or

a similar process undoubtedly precedes the ulcerative condition. Ulceration was noted in 31.3% of the cases. The seat of the ulcers was either at the base of the epiglottis or along the cords, usually along the posterior part of the cord, and in a few instances it was more or less general.

Histologically twenty-one cases were examined. The histological section was obtained by removing a portion of the larynx between two vertical and parallel incisions, including above the base of the epiglottis, and below a part of the trachea. The diseased side of the larynx was generally studied. The histological findings were as follows:

Normal,.....	5	} Out of 21 cases
Tuberculous ulceration,.....	11	
Submucous tubercles, ...	4	
Edema, ...	1	

It would be unfair to draw definite conclusions from the few cases examined or from the method of making the routine examination. The results are only approximate to the actual existing conditions. It will be seen, however, that 71.4% of the cases examined histologically showed a tuberculous condition, *i. e.*, 52.4% ulceration, and 19% submucous tubercles. In the study of the gross lesions we found only 39.2% of the cases showing tuberculosis.

TRACHEA.

The condition of the trachea was recorded as	Normal,.....	26	} Out of 55 cases
	Ulcerated,.....	12	
	Congested,.....	16	
	Infiltrated,.....	1	

The condition here noted was in the upper two-thirds of the trachea, which was removed at autopsy with the larynx. It will be seen that ulceration was less frequently, and congestion more frequently, observed than in the larynx. Congestion, especially of the lower third of the trachea, and of the bronchi just beyond the bifurcation of the trachea, was almost always present, but not recorded on our charts.

GASTRO-INTESTINAL TRACT.

ESOPHAGUS.

The esophagus was examined in fifty-six cases, but no pathological condition was observed. An usual slight abnormality was a discoloration of the mucous membrane of varying degree in the lower one-third, possibly due to post-mortem changes. Tubercles of the mucous membrane have been reported in a few cases, secondary to tuberculosis elsewhere, especially pulmonary tuberculosis, or tuberculosis of the upper respiratory tract or mouth cavity. Tuberculosis of the esophagus may also be due to extension of a tuberculous process from a mediastinal gland.

STOMACH.

Shape was recorded as.....	{	Normal,.....	49	} Out of 57 cases
		Hourglass contraction,.....	5	
		Contracted,.....	2	
		Funnel-shaped,.....	1	
Position was recorded as.....	{	Normal,.....	50	} Out of 57 cases
		Gastroptosis,.....	7	
Local abnormalities were recorded as.....	{	Tubercles subserous,.....	3	} Out of 57 cases
		Ulceration,.....	1	
		Pigmentation,.....	1	

SUMMARY FOR THREE YEARS.

Shape was recorded as.....	{	Normal,.....	52	} Out of 200 cases
		Hourglass contraction,.....	12	
		Contracted,.....	2	
		Funnel-shaped,.....	1	
		No record,.....	133	
Position was recorded as.....	{	Normal,.....	50	} Out of 200 cases
		Gastroptosis,.....	12	
		No record,.....	138	
Local abnormalities were recorded as.....	{	Tubercles subserous,.....	3	} Out of 200 cases
		Ulceration,.....	2	
		Pigmentation,.....	1	

The shape of the stomach does not materially differ in cases of chronic pulmonary tuberculosis from that in other conditions. The size, however, is perhaps, on the whole, very slightly larger than is usually found. This is perhaps due to the great quantities of milk the patients receive at the Institute.

Dropping of the stomach or gastroptosis is frequently observed, and with such a condition the transverse colon is found low in the

abdomen. These conditions, however, are due either to a relaxation of the tissues from the general asthenia, or to a developmental defect in the supporting tissues of these organs, rather than to specific relations with the tuberculous process.

Tuberculosis of the mucous membrane of the stomach is a very rare condition. In the numerous statistics collected in order to note its frequency the percentage showing typical tuberculous lesions is very small. Its rarity cannot be considered due to the gastric secretion alone, as it has been demonstrated experimentally that the secretion is not germicidal to the tubercle bacillus. The following reasons have been offered to explain this apparent immunity: first, that the absorptive powers of the stomach are less than other parts of the gastro-intestinal tract; second, that the few lymphoid nodes normal to the stomach do not offer a suitable soil for the bacilli; third, that the gastric secretion, while not destructive to the tubercle bacillus, may bring about such changes in the bacillus as to prevent it infecting this organ.

Even these explanations, however, are not satisfactory as to the great immunity of this organ, an immunity exceptionally high, and lasting even to the end. This is more remarkable when it is considered that the stomach, like the pharynx, is almost continually bathed in swallowed sputum containing great numbers of bacilli.

SMALL INTESTINE.

Condition was recorded as	Normal,.....	1	} Out of 57 cases
	Tuberculous ulcers in jejunum,.....	7	
	Tuberculous ulcers in ileum,.....	32	
	Tuberculous ulcers, location not stated,.....	18	
	Congestion,.....	40	
	Perforation,.....	1	

SUMMARY FOR THREE YEARS.

Condition was recorded as	Normal to external examination only,.....	22	} Out of 200 cases
	Normal to external and internal examination,.....	58	
	Tuberculous ulcers in jejunum,.....	9	
	Tuberculous ulcers in ileum,.....	38	
	Tuberculous ulcers, location not stated,.....	53	
	Congestion,.....	48	
	Perforation,.....	4	
	Tænia saginata,.....	1	
	Diverticulum,.....	1	

The study of the above table shows the remarkable fact that only one case was recorded as normal, and that fifty-six out of the fifty-seven cases showed somewhere between the pyloric end of the stomach and the ileocæcal valve definite tuberculous lesions, and the great majority of these were ulcers. The number of ulcers in a case varied from one or two small recent ulcers to great numbers of small and large ulcers, often several centimeters in length. The large ulcers appeared to be usually the result of the confluence of numerous smaller ones, or were old ulcers in which much of the mucous membrane was destroyed by extension of the tuberculous process along the lymphatic channels.

The very great frequency of tuberculous ulceration of the small intestines naturally suggests the swallowing of sputum as a cause, although the excretion of tubercle bacilli by the intestine has been suggested, and if this be true ulceration may be of hematogenic origin.

It is impossible to state from the character or extensiveness whether these intestinal lesions were primary or secondary. In drawing conclusions as to the primary seat or as to the age of a tuberculous lesion in an organ it must not be forgotten that the extensiveness and the amount of caseation which determine the so-called "oldness" of the lesion are dependent upon the organ and tissue involved, and the influence of mixed infections, rather than upon the age of the lesion.

LARGE INTESTINE.		
Condition was recorded as	Normal.....	6
	Tubercles.....	4
	Ulcers not tabulated as to few or many,....	4
	Ulcers few (cæcum),.....	8
	Ulcers few (region of ileocæcal valve),.....	1
	Ulcers few, not localized, ...	2
	Ulcers many (cæcum),.....	5
	Ulcers many (colon), ...	1
	Ulcers many (region of ileocæcal valve),....	1
	Ulcers many, not localized,.....	12
	Ulcers small and few (cæcum),.....	2
	Ulcers small and few (colon),.....	1
	Ulcers small and few, not localized,.....	4
	Congestion,.....	23
	Pigmentation,.....	3
		Out of 57 cases

SUMMARY FOR THREE YEARS.

Condition was recorded as	Normal,.....	73	} Out of 200 cases
	Tubercles,.....	7	
	Ulcers not tabulated as to few or many,.....	13	
	Ulcers few (cæcum),.....	8	
	Ulcers few (region of ileocæcal valve),.....	1	
	Ulcers few, not localized,.....	5	
	Ulcers many (cæcum),.....	5	
	Ulcers many (colon),.....	1	
	Ulcers many (region of ileocæcal valve),.....	1	
	Ulcers many, not localized,.....	14	
	Ulcers small and few (cæcum),.....	2	
	Ulcers small and few (colon),.....	1	
	Ulcers small and few, not localized,.....	5	
	Congestion,.....	23	
	Pigmentation,.....	3	
	Not recorded,.....	58	

In the table it is seen that six large intestines were recorded as normal in comparison with one small intestine out of the fifty-seven examined.

The head of the cæcum is most frequently involved, being involved nearly as frequently as the small intestine; in the great majority of cases the process in both is continuous. When present, tuberculous ulcers of the small intestine usually increase in number and size from the duodenum to the ileocæcal valve. In other words, the majority of lesions in the small intestines are at the lower end, and the process seems to extend directly from here into the head of the cæcum. As the lower part of the ileum is the most frequent seat of tuberculosis in the small intestine, so the cæcum is the most frequent seat in the large intestine. The underlying factors which may help to localize the tuberculous lesions in this part of the intestinal tract may be considered under the following heads:

1. Stagnation of the intestinal contents in the lower part of the ileum and in the cæcum. The fact that the feces of all cases of advanced pulmonary tuberculosis contain a great number of tubercle bacilli would in itself suggest that the lesions would be most numerous where the contents move slowly.

2. The great amount of lymphatic structure in the walls of the intestines in this region undoubtedly offers favorable soil for the growth of the tubercle bacillus.

The consideration of tuberculosis as a primary lymphatic disease should receive more attention than has hitherto been allotted to it. Here, however, attention may be called to the early tubercles in the solitary nodes and Peyer's patches. Very frequently microscopic tubercles are observed in these areas, when no macroscopic lesion of tuberculosis can be detected in the immediate neighborhood, and this is especially true in the appendix, where the lymph-nodes are so prominent. Of all the tissues of the body the lymphatic nodes seem to offer the most favorable soil and are most constant in showing the lesions of tuberculosis.

Three chief forms of tuberculosis are found in the large intestine:

1. Tubercles: These are usually situated in the submucosa or at the junction of the mucosa and submucosa, generally in lymphatic nodes, and stand out as rounded small areas beneath the epithelium. They may be present without ulceration, though this is uncommon, after they have reached any size.

2. Tuberculous Ulceration: Tuberculous ulceration of the large intestine does not materially differ from tuberculous ulceration elsewhere in the intestinal tract. The lesions in the head of the cæcum have a tendency, however, to run together and form larger ulcers of more irregular outline. In extreme cases the whole mucous membrane may be involved in the ulcerative process, and only isolated islands of mucous membrane remain.

3. Hyperplastic Tuberculosis: A hyperplastic tuberculous process of the head of the cæcum, sometimes extending into the colon, is recognized and has received special study by surgeons. In our statistics it is far less frequent than ulceration. In these cases the walls of the cæcum are hypertrophied, are thickened by tuberculous deposits, and become inelastic and much firmer than normal. The mucous membrane is of a dark red color and shows small elevations, so that the whole surface becomes coarsely granular—a granulation or fungoid tuberculosis. Ulceration to a small extent may be present, but is not prominent. The process

is frequently mistaken for other conditions, as the tuberculous nature is not evident from the general appearances. The glands in the neighborhood are usually enlarged, and if caseous to any extent may afford a clue to the true nature of the process. Many of these cases have been considered cancerous from their gross appearances until the microscope has revealed their true nature.

Histologically the intestine was examined in thirty-seven cases. The findings are not tabulated because no routine method was adopted for systematically recording the conditions found in the various parts. A general review of the findings may be considered of some value.

Enteritis of a varying degree of chronicity was recorded in twenty-one out of the thirty-seven cases examined. This was of a chronic type and showed changes most marked in the interglandular tissue. Together with these changes were found numerous mucous cells and a slight enlargement of the solitary lymphatic nodes. In no case was the condition extreme.

Tuberculous ulceration was noted in four cases, this number being much smaller than the macroscopic examination showed. Tubercles were noted in the submucosa without ulceration in seventeen cases. These tubercles were chiefly small and situated in lymphoid tissue, either at the junction of the mucosa and submucosa, or in the latter.

In a few cases subserous tubercles were also noted. These were found in cases in which ulceration had been noted at the autopsy table, and were in all likelihood tubercles along the walls of the lymph-channels in close proximity to the ulcerations or other lesions of the mucosa. Such lesions may have originated in these channels, as the mucous membrane allows the passage of tubercle bacilli.

Amyloid changes were observed in only four out of the thirty-seven cases examined. This is rather a smaller number of cases than would be expected from the number in which amyloid was observed as a marked condition in the spleen and liver. It must be

remembered, in drawing conclusions in regard to this as well as other conditions of the intestines, that no particular lesion was sought, and the few sections cut for histological examination were studied for the general condition rather than the special changes. Still, even considering the limited number of sections examined, the amyloid changes in the intestinal wall were not so frequent as in other organs.

APPENDIX.

Condition at autopsy was recorded as....	Normal,.....	37	} Out of 57 cases
	Congestion,.....	7	
	Adhesions,.....	10	
	Removed,.....	1	
	Thickened,.....	2	

The external appearances of the appendix only were noted at the time of the autopsy. It was fixed and prepared for histological section before opening.

The size of the organ varied between 4 cm. and 13 cm. in length. The average length in fifty-four cases recorded was 7.7 cm. Of fifty-four cases, twenty-four showed the appendix to be over 8 cm. in length. Adhesions were noted in ten cases (17.5%) These adhesions were in the great majority of instances old and fibrous. At autopsy the organ was noted congested in seven cases (12.3%). Of these seven cases, five showed marked tuberculosis. In the fifty-seven cases the appendix had been removed by operation but once.

For histological examination only twenty-eight cases were prepared. The subject of tuberculous appendicitis will be treated in detail in another paper, to be published in a future report, for which complete notes on the majority of the cases have been made. The examination, however, of these cases shows the following interesting conditions:

Of the twenty-eight cases examined, fifteen (53.5%) showed typical tuberculous lesions, either tuberculous ulcerations or miliary tubercles. These observations are from a single trans-

verse section of the organ, which was made for the routine examination, and the tubercles were not particularly sought. The finding of this high percentage of tuberculous lesions in the appendix after such an examination suggests that the organ would be found involved in a still greater number of cases if a more searching examination was made with that object in mind.

Eleven cases out of twenty-eight showed a chronic appendicitis, one of these of the obliterating type. Of these cases of chronic appendicitis, three only showed tubercles in addition to the chronic process.

The lymphoid tissue in the submucosa of the appendix was noted distinctly atrophied in nine of the chronic cases of appendicitis, and of these, tubercles were present in two cases. The tuberculous lesions were situated in the great majority of cases in the lymphoid tissue of the submucosa. The great amount of lymphoid tissue in the appendix, together with stagnation of the bacilli-laden fecal matter in these advanced cases of tuberculosis in this region of the intestines, undoubtedly accounts for the great frequency of the tuberculous lesions in this organ.

ISCHIORECTAL REGION.

Condition was recorded as....	{	Normal,.....	54	} Out of 57 cases
		Abscess,.....	1	
		Fistula,.....	2	

SUMMARY FOR THREE YEARS.

Condition was recorded as....	{	Normal,.....	115	} Out of 200 cases
		Scar,.....	1	
		Abscess,.....	2	
		Fistula,.....	7	
		Not recorded,.....	75	

The ischiorectal region was examined solely for the presence or absence of gross tuberculous lesions. Tuberculous ulceration with fistula was found in two cases, while a localized abscess was found in one case. The rectum showed in the majority of cases either internal or external hemorrhoids.

LIVER.

Color was recorded as.....	Normal.....	24	} Out of 57 cases
	Dark.....	14	
	Pale.....	8	
	Mottled.....	11	
Consistency was recorded as..	Normal.....	5	} Out of 57 cases
	Firm.....	35	
	Soft.....	17	
Condition was recorded as....	Normal.....	3	} Out of 57 cases
	Cirrhosis.....	1	
	Fatty.....	23	
	Passive congestion.....	12	
	Amyloid.....	12	
	Tubercles a few.....	28	
	Tubercles moderate.....	1	
	Tubercles numerous.....	2	
	Peri-hepatitis.....	2	

The important pathological changes in the liver found at autopsy in the fifty-seven cases are:

1. Tuberculosis.
2. Fatty change.
3. Amyloid change.
4. Congestion.
5. Cirrhosis.

1. *Tuberculosis*.—Tuberculosis of the liver may be present in the following forms: (a) Isolated few or numerous miliary tubercles; (b) solitary tubercles; (c) tuberculous cirrhosis.

(a) Miliary tubercles of the liver were observed in 54.4% of the cases at the autopsy table. These tubercles were small pinhead or less in size, and gray to gray-yellow in color, and were in the great majority of cases the result of a terminal infection. In twenty-eight out of fifty-seven autopsies they were few in number and usually observed directly beneath the capsule. In only two cases were they tabulated as numerous. A chronic, very much enlarged form of the tubercle is sometimes seen, though it is far less common than the small tubercles just described. In all except two cases the tubercles were small. In these two the tubercles varied in size from a large pea to a small cherry and contained considerable caseation. Histologically tubercles were observed in

the stained specimens of the liver in thirty-eight out of fifty-four cases examined (70.3%).

(b) Solitary tubercles of very large size have been reported in rare instances. We have had none of these.

(c) A tuberculous cirrhosis of the liver, showing tubercles in the newly formed connective tissue, has been described, but is much rarer than other types of tuberculosis. We have had none.

2. *Fatty Change*.—Fatty change in the liver varying in extent and character was noted at autopsy in 40.3% of the cases. In some the organ was a slightly mottled color of yellow and brown-red, while in others the changes were so marked that the organ was greatly enlarged, soft, and of a pale yellow color throughout. The amount of fatty change in the liver does not correspond to the amount of fat deposited elsewhere in the body; in fact, the most pronounced changes were sometimes found in the cases of extreme emaciation. Histologically fatty change was noted in 40.7% of the cases examined. This varied from involvement of a few liver cells to marked changes affecting practically all liver cells.

In 3.7% of the cases the fatty change was associated with a slight increase of the connective tissue, in 15% with congestion, in 5.5% with an increase of connective tissue and congestion, in 3.7% with amyloid change, and in 11.1% it was not associated with any of the above changes.

3. *Amyloid Change*.—Amyloid change was demonstrable at the time of the autopsy in 21.0% of the cases. The degree of change, however, varied greatly. In some cases the organ was scarcely enlarged, and in these the amyloid areas were small, while in others the organ was greatly enlarged and the cut surface showed to Lugol's solution an almost complete amyloid transformation of the organ.

The weight of the largest amyloid liver was 3040 g. In this case the last body weight recorded was 98½ lbs. (45,005 g.). The normal weight of the liver in a female has been estimated at one-thirty-sixth of the body weight. In this case the liver was

actually one-fifteenth of the body weight. In cases of this type the histological section shows an almost complete amyloid change or replacement of the liver tissue with amyloid material. The remaining liver cells are difficult to find.

4. *Congestion*.—The congestion of the liver observed in this class of cases is of the passive type, and results from the extensive changes in the respiratory apparatus, the effects of these changes upon the heart, and from the general asthenic condition which is naturally associated with weakened heart action.

5. *Cirrhosis*.—Cirrhosis of the liver has been noted in a certain number of cases of chronic pulmonary tuberculosis by various observers. Of these fifty-seven cases, only two presented what could be considered an excess of fibrous tissue, that is, fibrous tissue enough to subdivide the liver into distinct lobules, a macroscopic cirrhosis. In these two cases the organ showed a granular surface and a consistency firmer than normal. In one case the organ was about normal size; in the other it was considerably larger. The latter showed also fatty changes, which places the organ in the class of fatty cirrhosis so often spoken of in tuberculosis.

In 5.5% of the cases examined histologically a slight increase of interlobular connective tissue was observed, always associated with fatty change.

PANCREAS.

The condition was recorded as normal in all fifty-seven cases.

Tuberculosis of the pancreas has been universally described as a very rare disease. In the few cases in which it has been noted it has generally originated from an extension of a tuberculosis of the neighboring glands. Rarely does the pancreas become infected through the medium of the blood-current. This is probably due to some organic immunity, for it can scarcely be imagined, with the evidence of general blood infection manifested in many of these cases by the scattering of tubercles throughout other organs, that tubercle bacilli have not also been carried to the pancreas.

In the histological examinations of the pancreas of forty-five

cases, made under precisely the same conditions as those of other organs, in not one case has a typical tubercle or have changes suggestive of a tuberculous process been found. The changes found in the pancreas are, as a rule, exceptionally slight when compared to the secondary changes found in other organs. The cells of the glandular tissue are in some cases slightly cloudy and swollen, but outside of this not apparently changed.

Post-mortem changes have been noted in a few instances. These were localized to borders of the organ and to the intra-glandular tissue, but were infrequent and of slight extent. The only other change worthy of mention was an increase in the fibrous tissue surrounding the larger ducts, which was noted in fourteen of the forty-five cases examined (28.8%). It appeared as an overgrowth of old fibrous tissue, containing few fiber nuclei.

OMENTUM.

The amount of fat was recorded as	{	Normal,.....	33	} Out of 55 cases
		Excessive,.....	4	
		Diminished,.....	18	
Other conditions were recorded as	{	Adhesions,.....	3	} Out of 55 cases
		Caseous tubercles,.....	2	
		Edema,.....	1	

SUMMARY FOR TWO YEARS.

Amount of fat was recorded as	{	Normal,.....	87	} Out of 143 cases
		Excessive,.....	13	
		Diminished,.....	23	
		Not recorded,.....	20	

No report on first year's cases.

The preservation of a normal amount of fat in the omentum in some cases of chronic pulmonary tuberculosis is in marked contrast to the general decrease of fat elsewhere in the body. In other cases, however, the amount of fat decreases with the general emaciation, and the omentum becomes then a delicate, easily torn network which is generally rolled up in the region of the transverse colon.

Caseous tubercles were observed in the omentum in two cases. Tubercles of the omentum generally arise from blood infection, and are found along the course of the blood-vessels. In other

instances the tuberculous process extends from tuberculous lesions in other organs, on account of attachment of the omentum to them by adhesions.

PERITONEUM.

Condition was recorded as	{ Normal,.....	30	} Out of 57 cases
	{ General adhesions,.....	2	
	{ Local adhesions,.....	25	
Fluid was recorded as	{ Normal,.....	33	} Out of 57 cases
	{ Slight increase,.....	6	
	{ Excessive increase,.....	18	

SUMMARY FOR THREE YEARS.

Condition was recorded as	{ Normal,.....	131	} Out of 200 cases
	{ General adhesions	8	
	{ Local adhesions	43	
	{ Tuberculous adhesions,.....	2	
	{ Not recorded,.....	16	
Fluid was recorded as	{ Normal,.....	152	} Out of 200 cases
	{ Increased,.....	24	
	{ Slight increase,.....	6	
	{ Excessive increase,.....	18	
	{ Dark,.....	1	
	{ Cloudy,.....	2	
	{ Bloody,.....	2	
	{ Purulent,.....	4	

As seen from the table, the peritoneum was noted normal in thirty cases (52.6%); local adhesions were noted in twenty-five (44%); and general adhesions in two (3.5%). In other words, the peritoneum was practically normal in 96.6% of the cases. The great majority of the local adhesions were old and were usually found either in the region of the appendix or in the pelvis. Occasionally they were found between two knuckles of intestine or between the gall-bladder and the intestines.

The two cases of general adhesions were produced by a chronic fibroid peritonitis which originated from a tuberculous ulceration of the intestine that had extended to the peritoneal coat. Of these two cases one showed an obliteration of the right pleura and the other a right-sided pyothorax. The pericardium in both cases was normal; in other words, there was no definite relation between the serous surfaces of the pleura or pericardium and the peritoneum in these cases.

The fluid in the peritoneal cavity was noted as normal in

thirty-three cases, as slightly increased in six, and as excessive in eighteen. The fluid in all except four was clear and slightly yellow in color. In the four in which it was cloudy an early peritonitis was evident.

General tuberculosis of the peritoneum may have its origin through the blood, the lymphatics, or by direct extension of a tuberculous process from, for instance, the intestines, or, in women, the Fallopian tubes. This last is considered by surgeons as the most frequent source in women. The process may be of the miliary type and be associated with ascites, or of the adhesive type, when numerous adhesions are found having embedded in them varying sized caseous tubercles. In the latter case softening and pus-like collections may be found between the intestinal coils encapsulated by the adhesions.

KIDNEYS.

Shape was recorded as .	Normal,.....	Left,.....	40	} Out of 57 cases
		Right,.....	41	
	Lobulated,..	Left,.....	13	
		Right,.....	11	
	Flat,.....	Left,.....	3	
		Right,.....	3	
	Elongated,...	Left,.....	1	
		Right,.....	2	
Condition was recorded as,.....	Left,.....	Interstitial nephritis,.....	2	} Out of 57 cases
		Parenchymatous nephritis,.....	26	
		Parenchymatous nephritis, acute,.....	1	
		Diffuse nephritis,.....	22	
		Congested,.....	8	
		Pale,.....	2	
		Amyloid,.....	4	
		Miliary tubercles,.....	34	
		Movable,.....	2	
		Cysts,.....	3	
	Right,.....	Interstitial nephritis,.....	3	
		Parenchymatous nephritis,.....	27	
		Parenchymatous nephritis, acute,.....	1	
		Diffuse nephritis,.....	22	
		Congested,.....	7	
		Pale,.....	2	
		Amyloid,.....	4	
		Miliary tubercles,.....	36	
		Movable,.....	2	
		Cysts,.....	3	
		Tuberculosis (ulceration),.....	1	

The condition of the kidneys in tuberculosis has been carefully studied for the past three years by Dr. Joseph Walsh and a detailed account of his findings has been incorporated in special reports. He reports on the macroscopy of the kidney as a whole, on the macroscopic findings on cutting the kidney into many small pieces, and on the microscopic findings.

A small section of each pair of kidneys was always reserved by the pathologist for routine study. From these sections this study has been made. The findings are only those of a general routine examination. Classification of histological findings differs in detail according to the interpretation of the examiner. Especially is this true of slight changes. In addition the classification of the form of nephritis will vary according to the classification followed. The pathologist has endeavored to use a simple form of classification and has divided nephritis into three great groups.

1. Parenchymatous nephritis.
2. Interstitial nephritis.
3. Diffuse nephritis.

An acute and a chronic form of the three conditions has also been noted.

When the parenchyma only was affected, the case was classified under the first group; when the changes were limited or practically limited to the interstitial tissue, it was classified under the second group; and when a case showed histologically both parenchymatous and interstitial changes, it was classified as diffuse nephritis. As would be expected, the majority of cases fell into this group.

Isolated areas of chronic interstitial change are frequent in the kidneys; but the pathologist does not agree with Dr. Walsh's interpretation of them as being possibly healing or healed tubercles, for the following reasons: (1) Many conditions, such as scarlet fever, measles, and typhoid fever, are prone to produce interstitial changes in the kidney at the time of infection which in later



Pathological laboratory

life may be represented by these localized interstitial changes.

(2) Why should a progressively fatal case of chronic pulmonary tuberculosis, even with periods of quiescence of years' duration advanced far enough to produce fibroid changes, show an individual organ immunity sufficiently great to heal such lesions when healed lesions do not exist, as far as we know, in other organs?

(3) These fibroid changes are found in the kidneys of cases which do not show elsewhere in the body any typical lesion of tuberculosis.

In the table the general changes speak for themselves. The great majority of cases fall under the head of diffuse nephritis because the changes in the interstitial and parenchymatous tissues are usually both well marked. According to experimental evidence, these changes, interstitial as well as parenchymatous, are found whenever an active kidney irritant has been employed for the experiment. Therefore, in a condition like chronic pulmonary tuberculosis, when the process has extended over a period of years, and in which toxic matter from tissue destruction and the products of various bacteria, and especially the tubercle bacillus, must to a certain extent pass out through the kidney it is not at all surprising that kidney changes of a moderate grade are present in the great majority of cases.

In this study it is impossible to differentiate, even in the histological specimens, between the alterations which have occurred previous to the tuberculous infection from various causes, and those which are the direct result of it, with the exception naturally of tuberculosis of the kidney and possibly amyloid change.

From the table showing macroscopic changes found at autopsy it will be seen that parenchymatous nephritis was found in twenty-six cases (45.6%), interstitial nephritis in three (5.5%), and diffuse nephritis in twenty-two (38.6%). The microscopic examination, however, of fifty-four cases frequently showed a different diagnosis, which was to be expected on account of the further changes

found and because typical examples are seldom seen. The gross examination of a kidney, as a rule, does not foreshadow the picture that will be found in the same specimen when examined under the microscope. The final diagnosis of the condition of the kidney, therefore, should be made only from the microscopic examination. In the fifty-four cases examined histologically the following diagnoses were made:

Parenchymatous nephritis,.....	7 times	(13 %)
Interstitial nephritis,.....	1 time	(1.8 %)
Diffuse nephritis,.....	19 times	(35.1 %)
General cloudiness with slight interstitial changes—early diffuse nephritis,.....	27 times	(50 %)

It will be seen from the foregoing table that the majority of the changes come under the term of general cloudiness. In these the microscopic findings consist of general cloudiness and swelling of the epithelial cells of the cortex, with an early necrosis of the cells in a few tubules and a slight increase of interstitial tissue in small isolated areas of the cortex or at the line of junction between the cortex and medulla.

Tuberculosis.—Tuberculosis of the kidney may exist in the form of an acute or a chronic miliary tuberculosis and of an ulcerative tuberculosis. It may arise from a blood infection, from an extension of tuberculosis of the lower urinary tract, or from direct extension of a tuberculosis from a neighboring organ. The tuberculous lesions of the kidney found at autopsy were for the most part the result of a blood infection and were represented by small tubercles. These small tubercles varied in number, location, and distribution, though they were usually in the cortex. They may rightly be considered in the great majority of cases as terminal tubercles.

Tuberculous Ulceration.—Ulcerative tuberculosis of the kidney, or phthisis renalis, was present in only one case in the right kidney, out of the fifty-seven cases autopsied (1.6%). Ulcerative tuberculosis is of special interest since it has been considered as a

primary focus of tuberculosis in the body by some, while others claim it to be secondary to other lesions, and especially of the urogenital tract. The ulcerating process may be confined to one part of the organ, as the cortex or the pelvis. In advanced cases the process may be so extensive that the whole organ has ulcerated away, a pus cavity only remaining.

Amyloid Change.—Amyloid change responding to Lugol's solution was noted in the kidneys at autopsy in only four cases, a small percentage, when compared to the same change in either the spleen or the liver. Histologically the examination of fifty-four cases showed amyloid change in only five, or 9.2%. This, again, is a very low percentage compared with the number showing amyloid change on the microscopic examination of the liver and spleen. The associated changes in the kidneys of these cases were not constant enough to draw any definite conclusions from them.

BLADDER.

Condition was recorded as	{	Normal,.....	51	} Out of 57 cases
		Mucous membrane congested,	5	
		Distended,.....	6	
		Thickened walls,.....	1	
		Inflamed,.....	1	

SUMMARY FOR THREE YEARS.

Condition was recorded as	{	Normal,.....	108	} Out of 200 cases
		Distended,.....	13	
		Thickened walls,.....	19	
		Inflamed,.....	6	
		Mucous membrane congested,	5	
		Tuberculous ulcers,.....	3	
		Not recorded,.....	59	

The condition of the bladder in the fifty-seven cases autopsied was generally normal in fifty-one. In five cases there was slight congestion without inflammation. In one case the walls were thickened and inflamed, but no macroscopic changes were noted, indicating that the process was tuberculous.

Tuberculosis of the bladder when it occurs is generally secondary to tuberculosis of the kidneys or of the genital organs. In rare instances it may be secondary to tuberculosis of the lungs or other organs. It is usually observed as a tuberculous cystitis with ulceration and thickening of the bladder walls.

PROSTATE.

Condition was recorded as { Normal,..... 32 } Out of 38 cases
 { Enlarged,..... 6 }

In the cases of enlargement the process was not of a tuberculous nature as far as could be determined by macroscopic examination. No special study was made of these cases.

Tuberculosis of the prostate is usually secondary to a tuberculous process elsewhere in the urogenital organs. The organ becomes enlarged owing to a caseous process, which eventually may ulcerate into the neighboring parts.

TESTICLES.

Condition was recorded as { Normal,..... 34 } Out of 38 cases
 { Both tuberculous,..... 1 }
 { Enlarged right,..... 2 }
 { Hydrocele left,..... 1 }

Tuberculosis of the testicles is an uncommon condition and is usually secondary to a tuberculosis elsewhere in the body. It is frequently the first lesion in the genital organs. In only one case was tuberculosis of the testicle noted, and in this case both testicles showed marked enlargement and on section advanced caseation. The histological sections of this case showed typical tuberculosis.

The testicles were, as a rule, not removed from the body, and the examinations recorded in the normal cases are the result of careful external examination of these organs only.

OVARIES.

The ovaries were recorded as ..	Both normal.....	11	} Out of 19 cases
	Both fibroid.....	3	
	Left fibroid.....	1	
	Left fibroid and calcified.....	1	
	Both cystic.....	1	
	Both enlarged.....	4	
	Both congested.....	1	
	Both anemic.....	1	
	Both removed.....	1	

UTERUS.

Condition was recorded as	Normal.....	12	} Out of 19 cases
	Retroversion.....	2	
	Endometritis.....	1	
	Laceration of cervix.....	2	
	Tubercles.....	1	
	Polyp.....	1	
	Removed.....	1	

FALLOPIAN TUBES.

The Fallopian tubes were recorded as	Normal.....	17	} Out of 19 cases
	Dilated and tortuous.....	1	
	Removed.....	1	

The genital organs in the nineteen females autopsied showed tuberculosis in only one case. Tuberculosis of the female genitalia is usually a secondary process arising from an extension of a tuberculous peritonitis, tuberculous enteritis, or, in still rarer instances, is the result of a blood infection, the bacilli being carried to the parts from some distant tuberculous focus. Rarely tuberculosis of the genitalia is a primary infection.

In the one case the process was part of a general tuberculosis with marked pulmonary lesions. The Fallopian tubes were greatly enlarged, tortuous, and were distended by typical caseous material, and on microscopic examination showed typical tuberculous lesions. The uterus was enlarged, the walls were greatly thickened, and were also the seat of a tuberculous process. The ovaries, though enlarged and congested, failed to show evidence of tuberculosis.

This case was of special interest for the following reasons: The

acute process had followed the birth of a child about six weeks before death. Moreover, the whole tuberculous process suggested a type of infection more bovine in character than that usually seen in infection with the human bacillus.

SPLEEN.

Consistency was recorded as	Soft,.....	37	} Out of 57 cases
	Firm,.....	20	
Color was recorded as	Normal,.....	9	} Out of 57 cases
	Dark,.....	40	
	Pale,.....	8	
Condition was recorded as	Normal,.....	8	} Out of 57 cases
	Congested,.....	19	
	Miliary tubercles,.....	18	
	Amyloid,.....	14	
	Supernumerary,.....	3	

The spleen in cases of pulmonary tuberculosis usually shows at autopsy one of several conditions, or a combination of them.

Tubercles.—Miliary tubercles in the spleen usually come from a blood infection. At autopsy it is at times difficult to differentiate the small tubercles from enlarged follicles, and sometimes this is only possible with the aid of the microscope, especially in the case of the very small gray tubercles.

The number of tubercles varies with the degree of infection, and the size generally with the chronicity of the lesion. In some cases several distinct sizes may be observed, as in the liver and kidney. These result in all likelihood from repeated blood infections during the progress of the pulmonary lesion. Miliary tubercles were noted in 31.5% of cases, in the gross examination of the organ; and in 68% of the cases on histological examination. In the majority of the latter the tubercles were few and small, and in only two did they form large caseous nodules.

So-called "Affen Tuberculose" of the spleen—tuberculosis of the spleen with numerous varying sized caseous tubercles distributed throughout the organ, many of which are directly beneath the capsule, and which by their projection make the surface of the organ distinctly roughened and granular—is rarely found in

the adult in connection with chronic pulmonary tuberculosis, though it is not infrequently found in early childhood. It was noted in two cases of the present series.

Amyloid Change.—Amyloid change in the spleen was noted macroscopically in fourteen cases (24.6%) and microscopically in twenty-four out of fifty-three cases examined (45.3%).

In the histological examination the combination of tubercles, amyloid, and congestion was noted as follows:

Tubercles, amyloid, and congestion five cases (9.4%); tubercles and amyloid, eight cases (15%); amyloid and congestion, nine cases (17%); tubercles and congestion, ten cases (19%). The degree of congestion in these cases was in all likelihood not influenced either by the presence of tubercles or of the amyloid, but depended solely upon other causes, such as passive congestion and the effects of mixed infections. The more frequent finding of amyloid in the histological examination than at the autopsy table is explained solely by the degree of change.

Mixed Infections.—The effects of cavity formation in the lungs with the associated mixed infection and of bronchopneumonia of non-tuberculous origin may or may not bring about definite changes in the spleen. Yet the appearance of the spleen at autopsy in a certain number of these cases is not unlike that found in cases in which the disease is set up by organisms producing acute infectious diseases such as pneumonia. Such a spleen is usually enlarged, red to red-purple in color, of soft consistency, and shows the capsule more or less tense. Section shows the pulp semi-fluid, but not associated with marked congestion; the trabeculae are not prominent and the Malpighian bodies can practically not be detected with the naked eye.

Histologically the pulp shows varying degrees of congestion, the Malpighian bodies are few and small with ill-defined borders, and here and there a small miliary tubercle may be found. With the exception of the tubercle, those changes must be the result of influences other than that of the tubercle bacillus, for in other

cases of tuberculosis the organ presents practically a normal appearance.

Congestion, a softened consistency, and a dark color were noted in over half of the cases. While all of these changes cannot be said to be solely the result of mixed infection, because a passive congestion is likewise present in a number of cases, it may be partially responsible. The fact that mixed infections were present, as the bacteriological report shows, and the fact that changes in the spleen similar to these are seen when such infections occur apart from tuberculosis, make it very likely that they were due to the mixed infections. In the majority of the cases dying of an acute infection engrafted upon their chronic pulmonary condition (an infection noted clinically), the above changes are to be found in the spleen.

LYMPHATIC GLANDS.

Mesenteric, ..	{	Size was recorded as	{	Normal,..... 9	} Out of 57 cases
		Condition was recorded as		Enlarged,.....48	
				Distinctly caseous,25...	
Cervical, ...		Size was recorded as	{	Normal,.....37	
				Enlarged,.....20	
Bronchial,...	{	Size was recorded as	{	Normal,..... 3	
				Enlarged,.....54	
		Condition was recorded as		Anthracotic,.....49...	
Inguinal, ...		Size was recorded as	{	Normal,.....13	
				Enlarged,..... 3	
				Palpable,.....41	

The conditions of the bronchial and mesenteric lymphatic glands have been studied in all the cases, but of the cervical and inguinal only the size as determined by palpation. The microscopic examination of the mesenteric lymphatic glands has been made in a number of cases. It would be useless to draw conclusions in regard to the existence of a tuberculous process in the lymphatic glands without a thorough study of each gland, though it is more than likely that certain glands in each group would show tuberculosis if so studied. The fact that the tonsils are in the great majority of cases tuberculous would indicate the almost certain existence of tuberculosis in some of the draining glands.

The same line of reasoning is even more applicable in the case of the bronchial lymphatic glands. These glands not only drain the lungs, the seat of advanced tuberculosis in these cases, but are in close association with the mediastinal glands, which are in turn in close relation with the cervical and mesenteric glands.

The more recent ideas that the alimentary canal plays a great part as an avenue of entrance of the tubercle bacillus into the body, and the fact that the tubercle bacillus has been demonstrated to pass through the intestinal mucous membrane without leaving evidence of its passage, make the mesenteric lymphatic glands of special interest as probably the first seat of the tuberculous process.

The study of these glands as the primary seat was not possible because of the wide extent of the tuberculous process and the evident chance for auto-infection in our cases. In cases, however, which failed to show macroscopic lesions in the intestines, the mesenteric lymphatic glands examined showed enlargement at the time of autopsy and a typical tuberculosis on microscopic examination. No positive conclusions can be drawn from these findings, as a very small tuberculous focus in the form of an ulcer or of a submucous tubercle in the intestinal tract may have been overlooked. The fact that the mesenteric lymphatic glands are so frequently enlarged in these cases suggests that the bacilli which are swallowed may be the source of further dissemination of the process, if the lymphatic transportation be accepted.

A histological examination of the mesenteric glands was made in forty cases and showed tuberculous lesions in thirty-four (85%). In the routine examination of these glands only one or two sections were examined, so that a still greater percentage of tuberculous lesions might have been found, if further sections of the remaining six cases had been made.

The mesenteric lymphatic glands were of special interest in regard to the finding of amyloid. This was present in sixteen cases (40%), or far more frequently than in any other organ in the

body. The amount of amyloid change varied from slight thickening of the wall of a vessel to extensive microscopic changes.

It is unfortunate that all the organs of each case were not examined microscopically, but this was found impossible. The histological sections were made, however, in non-selected cases, so that the results in all likelihood represent the percentage of different findings in the whole series of the cases.

TONSILS.

Size was recorded as	{	Enlarged (both),.....	13	}	Out of 57 cases
		Left enlarged,.....	2		
		Right enlarged,.....	1		
		Atrophied (both),.....	2		
		No record,.....	39		
Condition was recorded as	{	Normal,.....	28	}	
		Ulcerated,.....	1		
		Tubercles (both),.....	4		
		Tubercles, right,.....	1		
		Tubercles, left,.....	1		
		Not removed,.....	22		

The tonsils have been considered for a long time an avenue for the entrance of the tubercle bacillus into the body. These organs are, on the one hand, a part of the lymphatic system, and, on the other, play a rôle in the upper gastro-intestinal tract similar to the solitary lymphatic nodes and Peyer's patches in the lower. They are, however, in a position where exposure to tuberculous infection is far greater than in the case of any other lymphatic structure lower down in the tract. Moreover, they are perhaps more exposed to other infections than similar structures elsewhere in the body, which may make them more susceptible to the tubercle bacillus.

Only very brief notes of their condition were made at autopsy, as the majority were prepared for histological examination. Histologically thirty-four cases were examined, and of these thirty (88.2%) showed tuberculous lesions. Of the remaining four cases, two showed no tubercles and two were atrophied and distinctly fibroid.

SUPRARENALS.

Size was recorded as	{	Normal, both,.....	41	} Out of 57 cases
		Normal, left,.....	2	
		Normal, right,.....	2	
		Increased, both,.....	3	
		Increased, left,.....	3	
		Increased, right,.....	2	
		Decreased, left,.....	1	
		Decreased, right,.....	2	
		No record,.....	7	
Shape was recorded as	{	Normal, both,.....	49	} Out of 57 cases
		Normal, right,.....	3	
		Elongated, both,.....	3	
		Elongated, left,.....	3	
Condition was recorded as	{	No record,.....	2	}
		Normal, both,.....	7	
		Normal, right,.....	3	
		Tubercles, left,.....	3	
		Caseous, both,.....	1	
		Caseous, left,.....	1	
	{	Anemic, right, ...	2	}
		No record,*.....	44	

* See histological examination.

At the autopsy only the general condition of the organ and the presence of tubercles on cross-section were noted. The gland was studied microscopically in fifty-two cases.

The examination of the gross specimen frequently shows more or less localized, minute, yellowish areas in the cortex of the gland. These areas are at times difficult to differentiate from small gray-yellow tubercles. Histological examination shows the cells of these areas to stain poorly and the so-called fat deposit to be excessive, but it shows no evidence of necrosis. These areas are usually localized to the two outer zones of cells of the cortical layer.

Tuberculosis was noted at autopsy in five cases. In two cases the gland was distinctly enlarged and caseous, while in the other three small miliary tubercles were found. Histologically the following changes were noted in the fifty-two cases examined:

Condition was recorded as	{	Normal,.....	9	} Out of 52 cases
		Fatty changes in cortex,.....	19	
		Congestion,.....	18	
		Increase of connective tissue,.....	4	
		Thickened capsule,.....	5	
		Tubercles,.....	6	
		Hemorrhage,.....	1	
	{	Amyloid,.....	5	}

Tuberculosis was noted histologically in six cases (11.5%), none of which showed clinical symptoms of Addison's disease. Amyloid changes were noted in five cases (9.6%). In these cases amyloid was always found in other organs, either the spleen or the liver, and usually to a marked degree.

THYROID GLAND.

Condition was recorded as.....	<table><tr><td>Normal,.....</td><td>48</td></tr><tr><td>Generally enlarged,.....</td><td>5</td></tr><tr><td>Not recorded,.....</td><td>4</td></tr></table>	Normal,.....	48	Generally enlarged,.....	5	Not recorded,.....	4	Out of 57 cases
Normal,.....	48							
Generally enlarged,.....	5							
Not recorded,.....	4							

Only very general notes were made of the condition of the thyroid gland at the time of autopsy. In the fifty-three recorded cases the gland was noted generally enlarged in five (9.6%). The left lobe above was noted enlarged in one.

Histologically examinations were made in forty-eight cases, with the following findings:

Normal,.....	16
Increased fibroid interglandular tissue,.....	32
Tubercles miliary,.....	1
Calcification of larger arteries,.....	6

Of the five cases of general enlargement noted at the time of autopsy, an histological examination was made in four. The enlargement was found to be due to an increase of connective tissue in three cases, two of which were women, while the fourth case was histologically normal.

In the routine examination of the thyroid only one case showing miliary tubercles was observed. This case did not show a particular blood dissemination of the tubercles, and though a few tubercles were found in other organs, they were not a prominent feature. This case illustrates the pathologist's contention that practically serial sections of an organ are necessary to determine the presence or absence of tubercles. The tubercles in the thyroid in this case did not differ in general structure from the tubercles in other organs, and from their general appearance they were probably brought to the gland by way of the blood.

URETERS.

The general condition of the ureters was normal in all cases. This was true even in the one case of ulcerative tuberculosis of the kidney, as the process in the kidney was not sufficiently advanced to produce any discoverable change in the ureter.

Tuberculosis of the ureter is usually due to the extension of a tuberculous process from the kidney or bladder. In rare instances the most constricted portion of the ureter, where it enters the bladder wall, may become tuberculous from an infection in the kidney. The process in the ureter may be indurative in character, showing great thickening of the walls and narrowing of the lumen, even to complete obliteration, or again may be ulcerative.

THYMUS GLAND.

The thymus gland was noted atrophied in all the fifty-seven cases autopsied.

In very young subjects this organ has sometimes been reported as the seat of a miliary tuberculosis or of a distinct caseous process.

C. Y. WHITE.

BACTERIOLOGICAL REPORT OF THE YEAR.

STUDIES OF MIXED INFECTION IN TUBERCULOSIS.

In practically no disease is there such abundant opportunity for study of every phase as in tuberculosis, and it would seem that we should have some definite and fixed notions in regard to most features of the disease. It is a sad commentary on our methods of study, and the interpretation of our results, that there can be such wide variation of opinion on such a constant feature in pulmonary tuberculosis as the occurrence and influence on the course of the disease of mixed or intercurrent infections. We find, in regard to this, the widest differences of opinion, some considering the effect of mixed infections as being the chief factor in the production of symptoms—and results—in pulmonary tuberculosis, while others are inclined to consider the influence of such infections as being of little or no importance. Experimentally, those who believe in the important influence of mixed infections have the firmest ground to stand on. Prudden long ago showed that the injection of streptococci into a rabbit already infected with tuberculosis would cause cavity formation in the lungs. It is well known that cavity formation almost never occurs in animals injected with tubercle bacilli alone. The general opinion on the

subject was well expressed by the Frenchman who said, "the worst thing that can happen to a tuberculous person is to come in contact with a consumptive."

The opinion that some, at least, of the various organisms found in cavities aid in the destruction of tissue seems well founded. Their position in the walls of the cavities can hardly be explained on any other assumption. The part they play in the production of pneumonia and bronchopneumonia is also an important one, and must influence the symptoms and course of the tuberculosis. It must be remembered, however, that pneumonia may be caused by the tubercle bacillus alone, as shown by Ophüls, and it seems certain that cavity formation can be caused by the tubercle bacillus alone. The not infrequent occurrence of saprophytic bacteria and of non-virulent organisms goes to show that some of the forms found in cavities are accidental infections, and play no part in the morbid processes.

The present study was made on fifty-six cases of pulmonary tuberculosis which came to autopsy. The average time which elapsed between death and the autopsy was twelve hours. Cultures from the various organs were obtained by searing the surface of the organ with a red-hot iron, and passing a large, flat, spear-pointed needle, with an eye drilled through it (Nuttall's spear), into the tissues through the seared area. The cultures were made for the most part on slanted 5% glycerine-agar, and were examined after forty-eight to seventy-two hours of incubation. Isolation of cultures was subsequently made on such media as seemed best for the case under examination.

BACTERIOLOGICAL STUDY OF CASES AUTOPSIED.

Number of cases studied, 56,.....	{	Fertile in all organs examined,.....	53
		Sterile in all organs—Case No. 3388,.....	1
		Sterile in all organs except liver—Case No. 3440,	1
		Sterile in all organs except spleen—Case No. 2764,.....	1

CASES EXAMINED AND MICRO-ORGANISMS FOUND.

	STREPTOCOCCUS.	STAPHYLOCOCCUS PYOGENES ALBUS.	STAPHYLOCOCCUS PYOGENES AUREUS.	PNEUMOCOCCUS.	PTOCTANEUS.	BACILLUS COLI COM- MUNE.	BACILLUS LACTIS AEROGENES.	BACILLUS DYSPH- THERIZ (PSEUDO?).	SARCINA.	SPIRILLUM.	SMALL DIPLOCOCCUS (UNIDENTIFIED).	BACILLUS (UNIDEN- TIFIED).	ASPERGILLUS.	BACILLUS MEGA- THERIUM.	BACILLUS TYPHOSUS.	CLADOBRIUM MICRO- TOMA.	YEASTS.
73.....	+	+	+	o	o	o	o	o	o	o	o	o	o	o	o	o	+
302.....	+	+	+	o	o	+	o	o	o	o	o	o	o	o	o	o	+
388.....	+	o	o	o	o	+	o	o	o	o	o	o	o	+	o	o	+
781.....	+	+	+	o	o	+	o	o	o	o	o	o	o	o	o	o	+
975.....	+	+	+	o	o	+	o	o	+	o	o	o	o	o	o	o	+
1767.....	+	+	+	o	o	+	o	o	o	o	o	+	o	o	o	o	+
2284.....	+	o	o	o	o	+	o	o	o	o	o	o	o	o	o	o	+
2388.....	+	o	o	o	o	+	o	o	o	o	o	o	o	o	o	o	+
2481.....	o	+	+	o	+	+	o	o	o	+	o	o	o	o	o	+	+
2632.....	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	+
2664*.....	o	+	o	o	o	o	o	o	o	o	o	o	o	o	o	+	+
2672.....	o	o	o	o	o	+	o	+	o	o	o	o	o	o	o	+	+
2676.....	+	o	+	+	+	+	o	o	o	+	+	+	o	o	o	+	+
2764.....	+	o	o	o	o	+	o	o	o	+	+	+	o	o	o	+	+
2780.....	+	+	+	o	o	+	o	o	o	o	+	+	o	o	o	+	+
2828.....	o	+	+	+	o	o	o	o	o	o	+	+	o	o	o	+	+
2957.....	o	+	+	+	o	+	o	+	o	o	o	o	o	o	o	+	+
2980.....	+	+	+	o	o	o	o	+	o	o	o	+	o	o	o	+	+
3050.....	+	o	o	o	o	+	o	o	o	o	o	+	o	o	o	+	+
3054.....	o	+	o	o	o	o	o	o	+	o	o	+	o	o	o	+	+
3096.....	+	o	o	+	o	o	o	+	o	o	o	+	o	o	o	+	+
3117.....	+	+	o	o	o	o	o	o	o	o	o	+	o	o	o	+	+
3120.....	o	+	o	o	o	o	o	o	o	o	o	+	o	o	o	+	+
3133.....	+	o	+	o	o	+	o	o	o	o	o	+	o	o	o	+	+
3142.....	o	+	o	o	o	+	o	+	o	o	o	+	o	o	o	+	+
3156.....	+	+	o	o	o	o	o	o	o	o	o	+	o	o	o	+	+
3163.....	o	+	+	o	o	+	o	o	+	o	o	+	o	o	o	+	+
3182.....	+	o	+	o	o	+	o	o	+	o	o	+	o	o	o	+	+
3207.....	+	o	+	o	o	+	o	o	o	o	o	+	o	o	o	+	+
3215.....	+	+	+	o	o	+	o	+	o	o	o	+	o	o	o	+	+
3251.....	+	+	+	+	o	+	o	+	+	o	+	+	o	o	+	+	+
3264.....	+	+	+	+	o	+	o	+	+	o	+	+	o	o	+	+	+
3355.....	+	o	o	o	o	+	o	o	o	o	o	+	o	o	o	+	+
3388*.....	o	o	o	o	o	+	o	o	o	o	o	+	o	o	o	+	+
3404.....	+	+	+	o	o	+	o	o	+	o	+	+	o	o	o	+	+
3405.....	+	+	o	o	o	+	o	+	o	o	o	+	o	o	o	+	+
3432.....	+	+	o	o	o	+	+	o	o	o	o	+	o	o	o	+	+
3435.....	+	+	o	+	o	o	o	o	+	o	o	+	o	o	o	+	+
3440.....	o	o	o	o	+	+	o	o	o	o	o	+	o	o	o	+	+
3451.....	+	+	+	+	+	+	o	o	o	o	o	+	o	o	o	+	+
3474.....	+	+	o	o	o	+	+	o	+	o	o	+	o	o	o	+	+
3499.....	o	o	o	o	o	+	+	o	o	o	o	+	o	o	o	+	+
3512.....	+	+	+	o	o	+	o	o	o	o	o	+	o	o	o	+	+
3519.....	+	+	+	o	o	+	o	o	o	o	o	+	o	o	o	+	+

* These cases showed no cavity formation.

CASES EXAMINED AND MICRO-ORGANISMS FOUND.—(Continued.)

	STREPTOCOCCUS.	STAPHYLOCOCCUS PYOGENES ALBUS.	STAPHYLOCOCCUS PYOGENES AUREUS.	PNEUMOCOCCUS.	PYOCYANEUS.	BACILLUS COLI COM- MUNIS.	BACILLUS LACTIS ACROGENES.	BACILLUS DIF- FERENS (PSEUDO?).	SARCINA.	SPERILLUM.	SMALL DIPLOCOCCUS (UNIDENTIFIED).	BACILLUS (UNIDEN- TIFIED).	ASPERGILLUS.	BACILLUS MEGA- THERIUM.	BACILLUS TYPHOSUS.	GLADOTHEX DICHO- TOMA.	YEASTS.
3521.....	+	o	+	o	o	+	o	o	o	o	o	o	o	o	o	o	o
3526.....	+	+	+	o	o	+	o	o	o	o	o	o	o	o	o	o	+
3537.....	+	+	+	o	o	+	o	o	o	o	o	o	o	o	o	o	o
3547.....	+	+	+	o	o	+	o	o	+	o	o	o	o	o	o	o	o
3559.....	+	o	+	o	o	+	o	o	o	o	o	o	o	o	o	o	o
3560.....	+	+	+	o	o	+	o	o	+	o	o	o	o	o	+	o	o
3589.....	o	+	o	+	o	+	+	+	+	o	o	o	o	o	o	o	o
3679.....	+	+	+	o	o	+	o	o	o	o	o	+	o	o	o	o	o
3697.....	+	+	+	o	o	+	o	o	o	o	o	o	o	o	o	o	o
3699.....	o	o	+	o	o	+	o	+	+	o	o	o	o	o	o	o	o
3705.....	o	o	+	o	o	+	o	+	o	o	+	o	o	o	o	o	o
3749.....	o	+	+	o	o	+	o	o	o	o	+	o	o	o	o	o	o
Total.....	39	30	26	9	5	40	3	11	12	2	5	11	0	1	1	3	12

Examination of the tables shows that our results agree in the main with those of other observers. The streptococcus, often in chains of pairs, was most frequently found, not only in cavities, but also in the organs. The notable exceptions to this were the kidney, in which the bacillus coli communis was found nineteen times and the streptococcus ten times; and the liver, in which the bacillus coli communis was found twelve times and the streptococcus only twice. The frequency with which the kidney was infected is worthy of comment, twenty-nine times in the fifty-six autopsies, leading the liver in this respect. It is, of course, impossible to say in what proportion of cases the bacillary invasion was agonal, or post mortem, but in any event the liver would seem to be more open to such invasion than the kidneys.

One of the most interesting of our observations was the isolation of the typhoid bacillus from the kidney. The culture was typical in every respect, and agglutinated with typhoid serum 1 : 100 in thirty minutes. The patient from whom it was obtained had denied ever having had typhoid fever. In lung cavities an

organism resembling the Klebs-Löffler bacillus is frequently found, and has been called the "pseudo-diphtheria bacillus pulmonalis." It is often indistinguishable morphologically and culturally from the true diphtheria bacillus, but we have never found it virulent for guinea-pigs. Some of our cultures we have been forced to regard as true diphtheria which had lost its pathogenic power.

LUNG CAVITIES.

Number of cases examined, micro-organisms being found in all 50,....	{	Streptococcus,.....	37
		Staphylococcus pyogenes albus,.....	25
		Staphylococcus pyogenes aureus,.....	24
		Pneumococcus,.....	8
		Bacillus pyocyaneus,.....	2
		Bacillus coli communis,.....	37
		Bacillus lactis aërogenes,.....	3
		Bacillus diphtheriæ (pseudo?),.....	9
		Sarcina,.....	10
		Yeasts,.....	12
		Spirillum,.....	1
		Small diplococcus (unidentified),.....	2
		Bacillus unidentified,.....	6

Cases Nos. 2664 and 3699 showed no cavity. In cases Nos. 2632, 2764, 3388, and 3440 the cultures were overgrown by a mould; these four cases are not included in the table.

AREAS OF BRONCHOPNEUMONIA.

Number of cases examined, 5,.....	{	In which micro-organisms were found, 3,....	{	Streptococcus,.....	1
				Staphylococcus pyogenes albus, ..	1
				Staphylococcus pyogenes aureus, ..	2
				Pneumococcus,.....	1
				Bacillus diphtheriæ,.....	1
				Bacillus coli communis,.....	1
				Unidentified diplococcus,.....	1
		In which no micro-organisms were found, 2			

KIDNEYS.

Number of kidneys examined, 56,.....	{	In which micro-organisms were found, 29, ..	Streptococcus,.....	10
			Staphylococcus pyogenes albus, ..	5
			Staphylococcus pyogenes aureus, ..	2
			Pneumococcus,.....	2
			Typhoid bacillus,.....	1
			Bacillus diphtheriæ (pseudo-), ..	3
			Bacillus lactis aërogenes,.....	1
			Bacillus pyocyaneus,.....	1
			Bacillus megatherium,.....	1
			Bacillus coli communis,.....	19
			Sarcina,.....	1
			Spirillum,.....	1
			Unidentified bacillus,.....	3
			Unidentified diplococcus,.....	2
		In which no micro-organisms were found, 27		

LIVER.

Number of livers examined, 56,.....	{	In which micro-organisms were found, 20,.....	Streptococcus,.....	2
			Staphylococcus pyogenes albus, .	1
			Staphylococcus pyogenes aureus, .	1
			Pneumococcus,.....	1
			Bacillus pyocyaneus,.....	2
			Bacillus coli communis,.....	12
			Bacillus lactis aerogenes,.....	2
			Cladothrix dichotoma,.....	2
			Unidentified bacillus,.....	4
			Unidentified diplococcus,.....	1
		In which no micro-organisms were found, 36		

SPLEEN.

Number of spleens examined, 56,....	{	In which micro-organisms were found, 13,.....	Streptococcus,.....	6
			Staphylococcus pyogenes albus, .	1
			Staphylococcus pyogenes aureus, .	1
			Bacillus coli communis,.....	7
			Bacillus diphtheriae (pseudo-), .	1
			Sarcinae,.....	1
			Cladothrix dichotoma,.....	1
			Unidentified bacillus,.....	3
		In which no micro-organisms were found, 43		

SPECIAL EXAMINATIONS IN SPECIAL CASES.

Pleura, Case No. 2676,.....	{		Streptococcus.	
			Bacillus coli communis.	
			Bacillus pyocyaneus.	
			Bacillus unidentified.	
Pneumothorax,.....	{	Case No. 2828,.....	Pneumococcus.	
		Case No. 3749,.....	Bacillus coli communis.	
			Unidentified bacillus.	
Pyopneumothorax, Case No. 2780,.....	{		Streptococcus.	
			Staphylococcus pyogenes aureus.	
			Bacillus coli communis.	
Heart and pancreas, Case No. 3405,.....			Negative.	
Heart's blood, Case No. 3451,.....	{		Streptococcus.	
			Pneumococcus.	
			Bacillus coli communis.	
Gall-bladder, Case No. 3133,.....	{		Staphylococcus pyogenes aureus.	
			Bacillus coli communis.	
Bronchial glands,...	{	Cases Nos. 1767 and 3117,.....	Negative.	
		Case No. 302,.....	Streptococcus.	
			Bacillus coli communis.	
		Case No. 3405,.....	Streptococcus.	
			Staphylococcus pyogenes albus.	
			Bacillus coli communis.	

The organisms put down as unidentified have all been studied, and in most cases inoculated into animals. In no case have we

had reason to believe that they were pathogenic, or played any part in the course of the general disease.

Our studies have not enabled us to draw any positive conclusions, though we are convinced that in pulmonary tuberculosis mixed infections play an important part in the production of symptoms and in the course of the disease.

MAZÏCK P. RAVENEL,
J. WILLOUGHBY IRWIN.

BACTERIOLOGICAL FINDINGS IN COMPARISON WITH THE PATHOLOGICAL DIAGNOSIS.

On account of the small number of cases on which we have so far been able to make a bacteriological report it seemed likely even in advance that a comparison of the bacteriological findings with the pathological diagnosis would mean very little, yet in order to complete the report this comparison has been made. The pathological diagnosis and the descriptions of the organs are taken from the autopsy report of Dr. C. Y. White.

THE MICRO-ORGANISMS FOUND IN BRONCHOPNEUMONIC AREAS IN COMPARISON WITH THOSE FOUND IN LUNG CAVITIES OF THE SAME CASES.

BRONCHOPNEUMONIC AREAS.								LUNG CAVITIES.								
CASE No.	Streptococcus.	Staphylococcus aureus.	Staphylococcus albus.	Pneumococcus.	Bacillus diptherie.	Bacillus coli communis.	Unidentified Diplococcus.	Streptococcus.	Staphylococcus aureus.	Staphylococcus albus.	Pneumococcus.	Bacillus diptherie.	Bacillus coli communis.	Unidentified Diplococcus.	Sarcina.	Yeast.
2664.....	o	+	o	o	+	o	o	+	+	o	+	+	+	o	+	+
3264.....	o	+	o	o	+	o	o	+	+	+	+	+	+	o	+	+
3749.....	o	o	+	o	+	o	+	+	+	+	+	+	+	o	+	+
3182.....	o	o	o	o	o	o	+	+	+	+	+	+	+	o	+	+
3589.....	o	o	o	o	o	o	o	+	+	+	+	+	+	+	+	+

In the case of the lungs, bacteriological cultures were made only from cavities and bronchopneumonic areas. The bacteriological report has already shown the micro-organisms found in cavities and bronchopneumonic areas independently of each other. Our first table shows the micro-organisms found

in bronchopneumonic areas in comparison with the micro-organisms found in the lung cavities in the same cases. In this table the micro-organism occurring most frequently both in the bronchopneumonic areas and the lung cavities is the staphylococcus pyogenes aureus.

THE MICRO-ORGANISMS FOUND IN CAVITIES IN CASES SHOWING BRONCHOPNEUMONIC AREAS, BUT IN WHICH THE BRONCHOPNEUMONIC AREAS WERE NOT CULTURED.

CASE No.	Streptococcus.	Staphylococcus aureus.	Staphylococcus albus.	Pneumococcus.	Bacillus coli communis.	Unidentified Bacillus.	Sarcina.	Yeast.
73.....	o	+	o	o	o	o	o	+
975.....	+	+	+	o	+	o	+	o
1767.....	+	o	o	o	+	+	o	+
3355.....	+	+	o	o	o	o	o	+
3537.....	+	o	+	+	+	o	o	o
2764.....	o	o	o	o	o	o	o	o
	4	3	2	1	3	1	1	3

Our second table shows the micro-organisms found in lung cavities in cases showing bronchopneumonic areas, but in which the bronchopneumonic areas were not cultured. In this series the streptococcus was the organism most frequently found, occurring four times in six cases, though the staphylococcus pyogenes aureus occurred three times in the six cases.

Kidneys.—In the comparison of the pathological condition of the kidneys with the bacteriological findings so many different micro-organisms were found in apparently the same pathological conditions that no conclusions can be drawn from the findings. Negative cultures were also obtained in practically all varieties of pathological conditions. The table showing the comparison is on the next page.

COMPARISON OF THE BACTERIOLOGICAL FINDINGS IN THE KIDNEYS WITH THE PATHOLOGICAL DIAGNOSIS.

Cloudy swelling,.....	Cases Nos. 2989, 3156, and 3440, cultures negative.
Cloudy swelling with tubercles,...	Case No. 3117, staphylococcus albus.
Acute parenchymatous nephritis with tubercles,.....	Case No. 3435, streptococcus, pneumococcus.
	Case No. 302, streptococcus, bacillus coli communis.
	Case No. 388, megatherium.
	Case No. 1767, staphylococcus albus, bacillus coli communis.
	Case No. 2284, bacillus coli communis.
	Case No. 2388, streptococcus, bacillus coli communis.
	Case No. 3096, bacillus diphtheriae.
	Case No. 3163, staphylococcus albus, bacillus coli communis.
Diffuse nephritis,.....	Case No. 3207, streptococcus.
	Case No. 3251, bacillus typhosus, small unidentified diplococcus.
	Case No. 3264, streptococcus, staphylococcus aureus.
	Case No. 3388, bacillus coli communis.
	Case No. 3404, bacillus coli communis.
	Case No. 3405, bacillus diphtheriae.
	Case No. 3512, streptococcus, bacillus coli communis.
	Cases Nos. 3050, 3182, 3451, 3537, 3560, and 3589, cultures negative.
Diffuse nephritis with tubercles, {	Case No. 3474, bacillus lactis aerogenes.
	Case No. 3521, streptococcus, bacillus coli communis.
	Case No. 3697, bacillus coli communis, unidentified bacillus.
	Cases Nos. 781, 3054, 3499, and 3679, cultures negative.
Diffuse nephritis with infarcts,...	Case No. 3699, staphylococcus aureus, sarcina.
Diffuse nephritis with amyloid degeneration,.....	Cases Nos. 2676 and 3705, cultures negative.
Chronic parenchymatous nephritis,.....	Case No. 2828, pneumococcus, bacillus coli communis.
	Case No. 3142, bacillus coli communis.
	Case No. 3355, bacillus coli communis, bacillus diphtheriae.
	Case No. 3559, bacillus coli communis.
	Cases Nos. 2664, 2672, and 3526, cultures negative.
	Case No. 975, bacillus coli communis.
Chronic parenchymatous nephritis with tubercles,.....	Case No. 2780, streptococcus, staphylococcus albus, bacillus coli communis.
	Case No. 3215, bacillus coli communis, unidentified bacillus.
	Case No. 3519, bacillus coli communis.
	Cases Nos. 2632, 2764, 2957, 3133, 3432, 3547, and 3749, cultures negative.
Chronic interstitial nephritis,.....	Case No. 3120, culture negative.
Chronic interstitial nephritis with tubercles,.....	Case No. 73, streptococcus, staphylococcus pyogenes albus.
Tuberculous ulceration of right kidney,.....	Case No. 2481, streptococcus, bacillus pyocyaneus, bacillus coli communis, spirillum.

COMPARISON OF THE BACTERIOLOGICAL FINDINGS IN THE SPLEEN WITH THE PATHOLOGICAL DIAGNOSIS.

	Case No. 2481, staphylococcus albus, staphylococcus aureus.
	Case No. 2780, bacillus coli communis.
	Case No. 3404, bacillus coli communis, three unidentified bacilli.
Normal,.....	Case No. 3519, bacillus coli communis.
	Case No. 3521, streptococcus.
	Case No. 3547, streptococcus, bacillus coli communis.
	Cases Nos. 2664, 2957, 3050, 3117, 3120, 3182, 3388, 3432, 3435, 3451, and 3560, cultures negative.
	Case No. 388, bacillus coli communis.
Amyloid,.....	Cases Nos. 73, 2388, 3142, 3697, 2672, 3589, and 3133, cultures negative.
	Case No. 2676, cladothrix dichotoma.
Amyloid with tubercles,....	Case No. 3705, bacillus coli communis, bacillus diphtheriae.
	Cases Nos. 2284, 2828, and 3215, cultures negative.
	Case No. 302, streptococcus.
	Case No. 3207, streptococcus.
Scattered tubercles,.....	Case No. 3512, streptococcus, bacillus coli communis.
	Cases Nos. 781, 975, 1767, 2989, 2632, 3264, 3054, 3405, 3156, and 3499, cultures negative.
	Case No. 2764, streptococcus.
Congestion,.....	Cases Nos. 3355, 3474, 3537, 3559, 3699, and 3679, cultures negative.
Congestion with tubercles,....	Cases Nos. 3163, 3440, 3526, and 3749, cultures negative.
Acute splenitis,.....	Case No. 3251, culture negative.
Acute splenitis with beginning amyloid,.....	Case No. 3096, culture negative.

Nothing can be concluded from the study of the pathological changes in the spleen in comparison with the micro-organisms found. The bacillus coli communis and the streptococcus each occurred five times, the streptococcus was found twice under apparently normal conditions, twice in conditions of miliary tuberculosis, and once in the condition of congestion.

It has been thought by various writers that a mixed infection with the streptococcus might be responsible for general miliary tuberculosis. The finding of the streptococcus in two cases of miliary tuberculosis, therefore, might have some significance except for the fact that in six other cases of miliary tuberculosis of the spleen the organ was sterile.

In the above table the definite diagnosis of the pathologist is shown in comparison with the bacteriological findings. Sometimes, however, the spleen was described as soft, and again as soft and congested, in the detailed description of the organ, even

though not soft or congested to the degree usually seen in acute splenitis.

The spleens described as soft, apart from those described as acute splenitis, were Nos. 302, 781, 975, 2664, 2676, 2780, 2828, 2957, 2989, 3054, 3117, 3133, 3142, 3156, 3182, 3207, 3264, 3355, 3388, 3404, 3405, 3435, 3440, 3474, 3512, 3526, 3547, 3559, 3560, 3697, 3749.

The following spleens were described as soft and congested: Nos. 3163, 3451, 3521, 3537, 3589.

COMPARISON OF THE BACTERIOLOGICAL FINDINGS IN THE LIVER WITH THE PATHOLOGICAL DIAGNOSIS.

Normal,.....	Cases Nos. 2664, 3096, 3117, 3120, 3388, 3435, and 3749, cultures negative.
Amyloid,.....	{ Case No. 388, bacillus coli communis. Case No. 2388, streptococcus, bacillus coli communis. Cases Nos. 2672 and 3142, cultures negative.
Amyloid with congestion,.....	Case No. 3264, culture negative.
Amyloid, congestion, and tubercles, ...	Case No. 3705, culture negative.
Amyloid with fatty changes,...	Case No. 73, culture negative.
Amyloid with tubercles,....	{ Case No. 3215, bacillus coli communis. Cases Nos. 2676 and 3133, cultures negative.
Amyloid, fatty change, and tubercles, ...	Case No. 2284, culture negative.
Congestion,.....	{ Case No. 3163, bacillus coli communis. Case No. 3697, bacillus coli communis. Cases Nos. 2764 and 3699, cultures negative.
Congestion with tubercles, ..	{ Case No. 781, bacillus pyocyaneus. Case No. 3440, bacillus coli communis. Cases Nos. 3432, 3589, and 3679, cultures negative.
Fatty,.....	{ Case No. 2481, staphylococcus albus, staphylococcus aureus. Case No. 3474, bacillus lactis aërogenes. Case No. 3526, bacillus coli communis. Case No. 3547, bacillus coli communis. Cases Nos. 2957, 3050, and 3182, cultures negative.
Fatty with tubercles,.....	{ Case No. 2632, cladothrix dichotoma. Case No. 2828, pneumococcus.
Fatty with congestion and tubercles,.....	{ Cases Nos. 1767, 3251, 3512, and 3560, cultures negative. Case No. 3355, bacillus coli communis. Case No. 3451, bacillus coli communis.
Cirrhosis,.....	{ Cases Nos. 975, 3519, and 3521, cultures negative. Case No. 3537, culture negative.
Scattered tubercles,.....	{ Case No. 302, bacillus coli communis. Case No. 3207, streptococcus, bacillus coli communis. Case No. 3404, small unidentified diplococcus, two unidentified bacilli. Case No. 3499, bacillus lactis aërogenes. Case No. 3559, cladothrix dichotoma. Cases Nos. 2780, 2989, 3054, 3156, and 3405, cultures negative.

As is evident from the study of the pathological changes in the liver and the different micro-organisms found, no conclusions can be drawn, because the only micro-organism occurring with any degree of frequency is the bacillus coli communis, the other micro-organisms occurring not more than once in different pathological conditions.

J. WILLOUGHBY IRWIN.

THE RELATION OF MICRO-ORGANISMS TO HEMORRHAGE IN TUBERCULOSIS.*

During the year 1905 we began a study of the cause of hemorrhage in tuberculosis. Reasoning from the standpoint of epidemicity of hemorrhages, we reached two possible hypotheses: first, that hemorrhage might be due to barometric conditions; and, secondly, that it might be due to micro-organisms. The micro-organismic hypothesis seemed the more plausible of the two, hence we decided to try it first. Of the micro-organisms, the one which, by reason of our knowledge, might most justly be accused of producing hemorrhages was the pneumococcus, inasmuch as true pneumonia is frequently accompanied by oozing of blood. We therefore decided to first look for the pneumococcus as the cause of hemorrhages.

We found the pneumococcus in the expectorated blood of hemorrhagic cases and were encouraged to pursue our studies along this line. Our studies have included other micro-organisms besides the pneumococcus, but with the idea that the pneumococcus was probably responsible for hemorrhages always in the foreground. We have reached no definite conclusions and now merely make a preliminary report.

We have studied unwashed sputum, washed sputum, blood-streaked sputum, and expectorated blood of patients with hemorrhages. We present the findings in each of these studies in tabular form.

We also present the pathological and bacteriological reports on the cases of which the expectorated blood and sputum had been studied and which came to autopsy. We do not present a histological report, but will do so at a future time.

* The bacteriological work which forms the basis of this article was done by Drs. M. P. Ravenel and J. W. Irwin; the tabulation, analysis, and review by Dr. Lawrence F. Flick.

RESULTS OF STAINING AND INOCULATION OF UNWASHED NON-HEMORRHAGIC SPUTUM.

NUMBER OF CASE.	DATE.	MICRO-ORGANISMS FOUND IN STAINED SPUTUM.			RECOVERED FROM BLOOD OF MOUSE.	
		Streptococcus.	Pneumococcus.	Influenza Bacillus.	Pneumococcus by Staining.	Pneumococcus in Culture.
3754.....	1-9-'06	N	o	o	+	+
3796.....	1-9-'06	N	o	o	o	o
3788.....	1-9-'06	N	+	o	o	o
2184.....	1-15-'06	N	o	o	o	o
1694.....	1-15-'06	+	o	o	o	o
3677.....	1-19-'06	N	o	o	o	o
3839.....	1-19-'06	N	o	o	+	+
3859.....	1-20-'06	N	o	o	o	o
3730.....	1-20-'06	N	o	o	o	o
2868.....	1-20-'06	N	o	o	o	o
3890.....	1-31-'06	N	o	o	+	+
3880.....	1-31-'06	N	o	o	o	o
2019.....	1-31-'06	N	o	o	o	o

N stands for no examination or no record; o stands for no micro-organisms found;
+ stands for micro-organisms found.

We studied the unwashed sputum of thirteen patients who were neither expectorating blood at the time nor had expectorated blood in the recent past. The sputum of these cases was stained for various micro-organisms and was injected into mice with the view of recovering the pneumococcus. The streptococcus was stained for in only one case and was found in this case.* The pneumococcus was stained for in all of the thirteen cases and was found in one. The influenza bacillus was stained for in all of the cases and was found in none.

One of the cases, No. 3754, had had blood-streaked sputum on

* This is the record. The probabilities are that the streptococcus was stained for in all of the cases, but that no record was made of the matter. The streptococcus is usually present in unwashed sputum. The incompleteness of the bacteriological record is due to our having started out with a very circumscribed problem, namely, looking for the pneumococcus as the cause of hemorrhages and having gradually enlarged it into looking for the cause of hemorrhage in some micro-organism. The only organism about which a careful record was made in the beginning is the pneumococcus.—L. F. F.

12—9—'05, just one month before the pneumococcus was recovered from the unwashed sputum, and in this blood-streaked sputum the pneumococcus had not been found. The study of the blood-streaked sputum was entirely negative.

The unwashed sputum was injected into mice in all of the thirteen cases. The pneumococcus was recovered from the blood of the mouse in three of these cases, and in all three of the cases from which it was recovered it had not been found in the stained sputum. In the case in which it was found in the stained sputum it was not discovered in the blood of the mouse by staining nor was it cultured from the blood of the mouse. In all three of the cases in which it was discovered in the blood of the mouse by staining it was also cultured from the blood of the mouse.

RESULTS OF INOCULATION OF MICE WITH NON-HEMORRHAGIC SPUTUM WASHED WITH STERILE SALT SOLUTION.

NUMBER.	DATE.	PNEUMOCOCCUS FOUND IN BLOOD OF MOUSE.
3378.....	6—15—'05	o
3226.....	6—15—'05	o
3432.....	6—15—'05	o
3280.....	7— 3—'05	o
3330.....	7— 3—'05	o
2019.....	9—12—'05	o
3215.....	9—12—'05	o
106.....	9—12—'05	+
2826.....	9—15—'05	o
2927.....	9—15—'05	o
2674.....	9—15—'05	o
3451.....	11— 2—'05	+

The sputum of twelve patients who showed no signs of blood-spitting was washed with sterile salt solution and injected into mice. In only two of the twelve cases was the pneumococcus recovered from the mice. One of these cases, No. 106, subsequently had a hemorrhage.

The percentage of cases in which the pneumococcus was recovered from washed sputum was only a little more than one-half that in which it was recovered from unwashed sputum; that is, in the washed sputum the pneumococcus was recovered in about 17%, and in the unwashed in about 30%.

RESULTS OF STAINING, CULTURE, AND INOCULATION OF BLOOD-STREAKED* SPUTUM.

NUMBER OF CASE	DATE.	MICRO-ORGANISMS FOUND IN STAINED SPUTUM.			MICRO-ORGANISMS FOUND IN CULTURED SPUTUM.				RECOVERED FROM BLOOD OF MOUSE.	
		Pneumococcus.	Streptococcus.	Pseudodiphtheria.	Pneumococcus.	Streptococcus.	Staphylococcus aureus.	Sarcinae.	Pneumococcus by Staining.	Pneumococcus in Culture.
P. C.....	6-20-'05	+	+	N	+	+	+	N	N	N
P. C.....	6-28-'05	o	+	+	o	+	o	+	N	N
3435.....	6-23-'05	o	+	N	N	N	N	N	+	+
917.....	11-8-'05	+	N	N	N	N	N	N	+	+
P. C.....	11-11-'05	+	+	N	N	N	N	N	+	N
Same case.....	11-14-'05	+	+	N	N	N	N	N	N	N
Same case.....	1-13-'06	+	o	N	N	N	N	N	N	N
3746.....	11-11-'05	+	N	N	N	N	N	N	+	+
2601.....	11-14-'05	o	N	N	N	N	N	N	+	+
3923.....	11-14-'05	+	N	N	N	N	N	N	o	o
3182.....	11-14-'05	+	N	N	N	N	N	N	N	N
P. C.....	11-21-'05	+	N	N	N	N	N	N	+	+
P. C.....	11-22-'05	+	N	N	N	N	N	N	o	o
1092.....	12-5-'05	+	N	N	N	N	N	N	N	N
871.....	12-6-'05	+	N	N	N	N	N	N	N	N
P. C.....	12-7-'05	+	N	N	N	N	N	N	N	N
3754.....	12-9-'05	o	o	N	N	N	N	N	o	o
P. C.....	12-12-'05	o	+	+	N	N	N	N	o	o
P. C.....	12-13-'05	o	N	N	N	N	N	N	N	N
3496.....	12-23-'05	+	N	N	N	N	N	N	N	N
1656.....	1-15-'06	+	+	N	N	N	N	N	N	N
3458.....	1-29-'06	o	N	N	N	N	N	N	o	o

The blood-streaked sputum of twenty cases was stained primarily with the view of discovering the presence of the pneumococcus. Out of the twenty cases the pneumococcus is recorded as having been found in thirteen and not found in seven. The streptococcus is recorded as having been found in six cases and not found in two. The pseudodiphtheria bacillus is recorded as having been found in two cases. The table shows a large number of cases in which it is uncertain whether or not the streptococcus and the pseudo-

* This table deals only with *blood-streaked* sputum or what might be called slight hemorrhage; the next table deals with frank hemorrhage in which a mouthful or more of pure blood was expectorated.

diphtheria bacillus were looked for. In the early part of the work the main idea was to search for the pneumococcus, and it is therefore probable that so far as the streptococcus is concerned the "no record sign" after the cases in the table merely indicates that no record was made as to its absence or presence. The pseudodiphtheria bacillus was not specially looked for, but was recorded when found.

In only two of the cases is it recorded that a culture was made. In one of these the pneumococcus, streptococcus, and staphylococcus were grown, and in the other case the streptococcus and a sarcina were grown.

The bloody sputum of eleven of the twenty cases was injected into mice; and the pneumococcus was found in the blood of the mouse in six of the cases injected. A culture from the blood of the mouse was made in eight cases and the pneumococcus was grown in three of the cases cultured.

In one of the cases in which no pneumococcus was recovered from the blood of the inoculated mouse the streptococcus and the pseudodiphtheria bacillus had been found in the stained sputum; and in one case in which the pneumococcus was recovered from the blood of the inoculated mouse and grown in a culture from this blood the pneumococcus had not been found in the sputum. In two cases in which the pneumococcus had been found in the sputum it was not recovered either by staining or culture from the blood of the mouse.

In this series of cases the pneumococcus was found in the sputum on staining in 65% of the cases, and was recovered from the mouse in 30% of the cases. Some allowance must be made for occasional accidents to mice, in comparing the results of the two methods of study. For all of the twenty cases there is a record as to staining, while for nine of the twenty cases there is no record as to inoculation. Of the cases recorded as having been inoculated, 54.5% gave a positive result as to the pneumococcus.

RESULTS OF STAINING, CULTURE, AND INOCULATION OF A DEFINITE HEMORRHAGE.

NUMBER OF CASE.	DATE.	MICRO-ORGANISMS FOUND ON STAINING.			MICRO-ORGANISMS FOUND ON CULTURE.					PNEUMOCOCCUS RECOVERED FROM BLOOD OF:				PSEUDODIPHTHERIA BACILLUS RECOVERED FROM BLOOD OF:	
		Pneumococcus.	Streptococcus.	Influenza.	Pneumococcus.	Streptococcus.	Staph. aureus.	Pseudodiphtheria.	Cladothrix dich.	Mouse on Staining.	Rabbit on Staining.	Mouse on Culture.	Rabbit on Culture.	Guinea-pig on Staining.	Guinea-pig on Culture.
3096.....	3-23-'05	+	+	N	N	N	N	N	N	N	N	N	N	N	N
Same case	4-4-'05	+	N	O	+	+	N	N	N	N	N	N	N	N	N
P. C.....	3-24-'05	+	+	N	N	N	N	N	N	N	N	N	N	N	N
P. C.....	5-7-'05	+	+	N	N	N	N	N	N	N	+	N	N	N	N
P. C.....	5-7-'05	N	N	N	+	N	N	N	N	N	N	N	N	N	N
P. C.....	5-29-'05	+	N	N	N	N	N	N	N	N	O	N	O	N	N
Same case	6-22-'05	O	+	N	N	N	N	N	N	N	N	N	N	N	N
3405.....	6-8-'05	O	+	N	N	N	N	+	+	O	N	O	N	O	O
Same case	6-11-'05	O	+	N	N	+	N	+	N	N	N	N	N	N	N
P. C.....	6-28-'05	O	O	O	O	O	N	N	N	O	N	O	N	N	N
3435.....	7-6-'05	O	O	N	N	N	N	N	N	N	N	N	N	N	N
3440.....	7-18-'05	O	+	N	N	+	N	N	N	N	N	N	N	N	N
P. C.....	7-31-'05	O	O	N	N	N	N	N	N	N	N	N	N	N	N
P. C.....	8-9-'05	O	+	N	N	N	N	N	N	N	N	N	N	N	N
P. C.....	8-10-'05	O	+	N	N	N	N	N	N	N	N	N	N	N	N
P. C.....	9-16-'05	?	O	N	N	N	N	N	N	O	N	O	N	N	N
106.....	10-16-'05	+	+	N	N	N	N	N	N	O	N	+	N	N	N
3589.....	11-1-'05	+	+	N	N	N	N	N	N	O	N	O	N	N	N
P. C.....	12-4-'05	O	O	N	N	N	N	N	N	O	N	O	N	N	N
Same case	12-8-'05	+	O	N	N	N	N	N	N	N	N	N	N	N	N

The expectorated blood of sixteen cases with frank hemorrhage was studied. The pneumococcus was stained for in fifteen of the sixteen cases and was found in seven; the streptococcus was stained for in fifteen and was found in ten; and the influenza bacillus was stained for in two and found in none.

Cultures are recorded as having been made in six of the sixteen cases. In two the pneumococcus was recorded as having been grown and in one as not having been grown; in three the streptococcus was recorded as having been grown and in one as not having been grown; in one the staphylococcus is recorded as having been grown and there is no record of any failures of growth; and in two the pseudodiphtheria bacillus is recorded as having been grown and there is no record of failures.

The expectorated blood of six of the sixteen cases is recorded as having been injected into mice. The pneumococcus was discovered in the blood of the mouse by staining in none of these cases and was cultured from the blood of the mouse in one case. In two cases the blood is recorded as having been injected into a rabbit and in one of these the pneumococcus was found in the blood of the rabbit by staining. In the cases in which the pneumococcus was recovered from the blood of the mouse and the rabbit the streptococcus as well as the pneumococcus had been found in the expectorated blood.

PATHOLOGICAL DIAGNOSIS AND DESCRIPTION OF THE SPLEEN IN CASES STUDIED WHICH CAME TO AUTOPSY. (By C. Y. WHITE.)

NUMBER.	DATE OF DEATH.	PATHOLOGICAL DIAGNOSIS.	CONDITION OF THE SPLEEN.
106.....	11—20—'05	Chronic obliterating pleurisy (right side), chronic fibroid pleurisy (left side to fourth rib), chronic tuberculosis of lungs with cavity formation and caseation, congestion of larynx, calcification of thyroid vessels, amyloid liver with miliary tubercles, tuberculous enteritis, slight parenchymatous nephritis with slight interstitial changes and miliary tubercles, tuberculous lymphadenitis with few small cysts, amyloid spleen with miliary tubercles, tuberculous tonsillitis with fibroid changes.	Length, $17.5 \times 11 \times 5$ cm. Weight, 496 g. Shape, greatly thickened. Consistency, firm. Capsule, negative. Trabeculae, not prominent. Section-surface, smooth; color, dark red. Pulp, dark red, translucent. Follicles, not prominent. Special observation, diffuse amyloid degeneration.
3215.....	12—9—'05	Chronic fibroid pleurisy of left side, chronic obliterating pleurisy, chronic tuberculosis of lungs with cavity formation, congestion of trachea, amyloid liver with tubercles, chronic enteritis with tubercles in the submucosa, chronic parenchymatous nephritis with tubercles, amyloid spleen with tubercles, tuberculosis of tonsils, tuberculosis of mesenteric glands.	Length, $14.5 \times 8.5 \times 3$ cm. Weight, 233 g. Shape, normal with a small fissure at lower end. Consistency, firm. Capsule, generally normal except lower end which is firmly adherent to chest wall. Trabeculae, prominent. Section-surface, smooth; color, reddish brown. Pulp, reddish brown, sago bodies. Follicles, not prominent. Special observation, a typical sago spleen.

PATHOLOGICAL DIAGNOSIS AND DESCRIPTION OF THE SPLEEN IN CASES STUDIED WHICH CAME TO AUTOPSY.—(Continued.)

NUMBER.	DATE OF DEATH.	PATHOLOGICAL DIAGNOSIS.	CONDITION OF THE SPLEEN.
3432.....	8—19—'05	Chronic obliterating pleurisy, sacculated empyema, chronic tuberculosis of lung with cavity formation, tuberculous laryngitis, congestion of liver with tubercles, tuberculous enteritis, parenchymatous nephritis with miliary tubercles, tuberculous adenitis.	Length, 11 × 6.5 × 2.5 cm. Weight, 93 g. Shape, normal. Consistency firm. Capsule, normal. Trabeculae, not prominent. Section-surface, smooth; color, red. Pulp, red. Follicles, not prominent.
3096.....	4—7—'05	Chronic fibroid pleurisy, chronic pulmonary tuberculosis with cavity formation, subacute miliary tuberculosis of the lungs, pulmonary hemorrhage, acute splenitis with beginning amyloid changes, diffuse nephritis, hour-glass contraction of stomach, chronic interstitial enteritis.	Length, 13½ × 10½ × 3 cm. Weight, 326 g. Shape, normal but flattened. Consistency, very soft. Capsule, not thickened. Trabeculae, not prominent; color, dark red. Section-surface, granular. Pulp, soft, congested. Follicles, fairly numerous. Special observation, an organ of acute infection.
3405.....	6—14—'05	Chronic fibroid pleurisy with general adhesions, chronic tuberculosis of lungs with cavity formation, congestion of liver with tubercles, tuberculous enteritis, slight parenchymatous nephritis, amyloid (early stage) spleen with tubercles, tuberculosis of tonsils, tuberculosis of mesenteric, cervical, and bronchial lymphatic glands.	Length, 13 × 8 × 4 cm. Weight, 194 g. Shape, normal. Consistency, soft. Capsule, negative. Trabeculae, not increased. Section-surface, granular; color, generally reddish-brown, several miliary tubercles. Pulp, reddish brown, not especially congested. Follicles, not prominent.
3435.....	7—6—'05	Chronic obliterating pleurisy (left side and right side with exception of extreme apex), chronic tuberculosis of lung with cavity formation and edema, chronic fibroid peritonitis (with adhesions localized), chronic caseous tubercles of the peritoneum, tuberculous enteritis, tuberculous appendicitis, tuberculous salpingitis, tuberculous adenitis and tonsillitis.	Length, 16 × 10 × 4 cm. Weight, 326 g. Shape, flattened. Consistency, greatly softened. Capsule, not thickened. Trabeculae, not prominent. Section-surface, granular; color, terra cotta. Pulp, studded with enlarged and irregular follicles or miliary tubercles. Special observation, the organ is moderately enlarged and softened. The Malpighian bodies or tubercles are very numerous. The spleen pulp contains a small amount of amyloid change.

MICRO-ORGANISMS AND HEMORRHAGE IN TUBERCULOSIS. 237

PATHOLOGICAL DIAGNOSIS AND DESCRIPTION OF THE SPLEEN IN CASES STUDIED WHICH CAME TO AUTOPSY.—(Continued.)

NUMBER.	DATE OF DEATH.	PATHOLOGICAL DIAGNOSIS.	CONDITION OF THE SPLEEN.
3440.....	8—11—'05	Chronic fibroid pleurisy (left side), chronic obliterating pleurisy (right side), chronic tuberculosis of lung with cavity formation, tuberculous laryngitis (submucous tubercles), congestion of liver with miliary tubercles, tuberculous enteritis, tuberculous appendicitis, cloudiness of kidneys, congestion of spleen with miliary tubercles, tuberculous adenitis.	Length, 12 × 8 × 3.5 cm. Weight, 217 g. Shape, normal. Consistency, greatly softened. Capsule, not prominent. Trabeculae, negative. Section-surface, smooth; color, deep red. Pulp, very soft and red. Follicles, not prominent. Special observation, the pulp contains one or two minute tubercles.
3589.....	11—7—'05	Chronic fibroid pleurisy with adhesions (left), chronic obliterating pleurisy (right side), chronic tuberculosis of lungs with cavity formation, congestion of liver with tubercles, tuberculous appendicitis, congestion of intestines, diffuse nephritis, amyloid degeneration of spleen and of mesenteric lymphatic glands.	Length, 11 × 8 × 3 cm. Weight, 140 g. Shape, normal. Consistency, soft. Capsule, normal. Trabeculae, not prominent. Section-surface, granular; color, deep red. Pulp, soft, not particularly congested. Follicles, not prominent. Special observations, the organ seems small for the size of the individual. It appears like a rather pulsataceous mass with congestion.

Eight of the cases studied came to autopsy during the year. Six of the eight, namely, Nos. 3096, 3405, 3435, 3440, 3589, and 106 had hemorrhages; two, namely, 3432 and 3215, had neither hemorrhages nor blood-streaked sputum. The ordinary sputum of these latter two was washed with sterile salt solution and injected into mice. Of the six cases with hemorrhages, one, namely, No. 106, also had had the sputum washed with sterile salt solution and injected into a mouse. None of the cases which came to autopsy had the unwashed sputum studied. One of the cases which came to autopsy, and which also had a hemorrhage, namely, No. 3435, had bloody sputum studied in addition to the expectorated blood.

Case No. 3096 had a hemorrhage on 3—23—'05. The pneumo-

coccus and streptococcus both were found on staining the expectorated blood. There is no record of a culture or of a mouse being inoculated. The patient had another hemorrhage on 4—4—'05. The pneumococcus was found in the stained blood, but not the streptococcus. A culture gave both the pneumococcus and the streptococcus. There is no record of a mouse having been injected. The patient died on 4—7—'05, a few days after the last hemorrhage. The pathological diagnosis does not name pneumonia. The autopsy record says of the left lung, lower lobe: "The whole lobe contains irregular caseous nodules varying in size from 2 mm. to 5 mm. These areas of caseous bronchopneumonia are hard and feel like shot embedded in the lung tissue. The bronchopneumonic areas comprise about one half of the lobe." There was acute splenitis.

Case No. 3405 had a hemorrhage on 6—8—'05. The stained expectorated blood showed streptococcus, but no pneumococcus. Culture gave pseudodiphtheria bacillus and cladothrix dichotoma, and there is no record of a culture for pneumococcus or streptococcus. Inoculation of a mouse with the expectorated blood proved negative. A guinea-pig was inoculated with the pseudodiphtheria bacillus without injury to the guinea-pig and the pseudodiphtheria bacillus was not recovered from the blood of the guinea-pig. On 6—11—'05 another hemorrhage occurred. The streptococcus was again found in the stained blood, but no pneumococcus. The streptococcus and pseudodiphtheria bacillus were found on culture, but not the pneumococcus. The patient died on 6—14—'05. Pneumonia is not mentioned in the pathological diagnosis. Of the left lung, lower lobe, it is recorded in the autopsy report: "The lobe contains two rather large caseous pneumonic areas measuring about $1 \times 5 \times 3$ cm. In these areas the section surface is generally grayish and contains considerable caseation. Throughout the rest of the lobe there are nodular masses similar to those found in the upper lobe. Between these nodules and pneumonic areas the tissue is somewhat congested but in fairly

good condition." Of the right lower lobe is recorded, "the lobe contains some isolated large bronchopneumonic areas." The consistency of the spleen was soft.

Case No. 3435 had bloody sputum studied on 6—23—'05. The streptococcus was found in the stained sputum, but not the pneumococcus. The bloody sputum was injected into a mouse and the pneumococcus was recovered from the blood of the inoculated mouse on staining, but not in culture. This case had a hemorrhage on 7—6—'05. Neither the pneumococcus nor the streptococcus was found in the stained expectorated blood, and there is no record of a culture having been made or of the blood having been injected into a mouse. The case died shortly after the hemorrhage on 7—6—'05. The pathological diagnosis does not include pneumonia as the cause of death. There is no reference to pneumonic areas nor to consolidated spots in the detailed record of the autopsy. The lungs were generally edematous. The spleen was greatly softened. The case was a very acute one and was in the hospital only two weeks.

Case No. 3440 had a hemorrhage on 7—18—'05. The stained expectorated blood showed the streptococcus, but not the pneumococcus. The streptococcus and staphylococcus aureus were cultured. There is no record of a mouse having been inoculated. The patient died 8—11—'05. The pathological diagnosis does not mention pneumonia. The autopsy record of the left lung, lower lobe, reads: "The lower one-third shows pneumonic consolidation"; of the right upper lobe: "The upper and anterior one-half of lobe is densely infiltrated with colored caseous areas and pneumonic infiltration." The spleen was greatly softened.

Case No. 3589 had a hemorrhage on 11—1—'05. Both the pneumococcus and the streptococcus were found in the stained expectorated blood. There is no record of a culture having been made. The pneumococcus was not recovered either by staining or culture from the blood of the injected mouse. The patient died

on 11-7-'05. The pathological diagnosis does not mention pneumonia. The autopsy record reads of left upper lobe: "Remainder of the lobe is consolidated and practically airless. The consolidation consists of caseation and pneumonic infiltration"; of right middle lobe, "the whole lobe is generally consolidated with pneumonic infiltration and caseous areas"; of the left lower lobe, "the whole lobe is generally consolidated with pneumonic infiltration and caseous areas"; of the right lower lobe, "shows moderate edema, pneumonic areas, and bronchopneumonia."

Case No. 106 had the sputum washed with sterile salt solution and injected into a mouse on 9-12-'05. The pneumococcus was recovered from the mouse. This same case had a hemorrhage on 10-16-'05. Staining of the blood showed the pneumococcus and streptococcus. Moreover the blood of a mouse inoculated with part of the hemorrhage showed the pneumococcus on culture. The patient died on 11-20-'05. The autopsy showed a very chronic advanced tuberculosis. The pathological diagnosis does not include pneumonia as one of the causes of death. The detailed record of the autopsy says of the left lower lobe: "The lower half of the lobe contains extensive areas of caseous pneumonia"; of the right lung, upper lobe, "the remainder of lobe consolidated and containing increase of fibrous tissue"; of the middle lobe, "the anterior central part of the lobe is air-bearing, while the remainder of the lobe is consolidated and of a caseous yellow color"; and of the lower lobe, "the posterior part is consolidated and of a yellow color." The spleen in this case was amyloid.

Case No. 3432 had the ordinary non-hemorrhagic sputum washed in sterile salt solution and injected into a mouse on 6-15-'05. The pneumococcus was not recovered from the mouse by staining or culture. No further study was made of the sputum. There was no hemorrhage nor bloody sputum. The case died 8-19-'05. The pathological diagnosis does not mention pneumonia. The autopsy record says of the left upper lobe, "the remainder of the lobe contains numerous bronchopneumonic

areas, in the center of which are grayish tubercles"; and of the lower lobe, "the rest of the lobe contains numerous areas of bronchopneumonia, the center of which contains grayish tubercles about 2 cm. in diameter"; and of the right lung, upper lobe, "the lobe is consolidated."

Case No. 3215 had ordinary non-hemorrhagic sputum washed in sterile salt solution and injected into a mouse on 9-12-'05. The pneumococcus was not recovered from the mouse either by staining or on culture. No other study was made of the sputum. There was neither bloody sputum nor hemorrhage. The case died on 12-9-'05. The pathological diagnosis does not mention pneumonia. The autopsy record says of the left lung, "the posterior one-third is consolidated, the consolidation consisting of tuberculous foci in various stages of caseation."

BACTERIOLOGICAL STUDY OF CASES AUTOPSIED.

NUMBER OF CASE.	DATE AUTOPSIED.	IN LUNG CAVITIES.							IN KIDNEYS.					IN BRONCHIAL GLANDS.				IN LIVER.
		Pneumococcus.	Streptococcus.	Staph. aureus.	Pseudo-diphtheria Bacillus.	Bacillus lactis aerogenes.	Bacillus coli com- munis.	Staph. albus.	Sarcina.	Pneumococcus.	Streptococcus.	Pseudo-diphtheria Bacillus.	Bacillus coli com- munis.	Unidentified Bacil- lus.	Streptococcus.	Staph. albus.	Bacillus coli com- munis.	
3096...	4-7-'05	+	+	o	o	o	o	o	o	o	o	+	o	o	o	o	o	o
3405...	6-14-'05	+	+	o	o	o	o	+	+	+	+	+	+	+	+	+	+	+
3435...	7-6-'05	+	+	o	o	o	o	+	+	+	+	+	+	+	+	+	+	+
3440...	8-11-'05	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
3589...	11-7-'05	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3432...	8-19-'05	o	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3215...	12-9-'05	o	+	+	+	o	+	o	o	o	o	o	o	o	o	o	o	o

No bacteriological study made of case No. 106.

Of the eight cases which came to autopsy, all except No. 106 were studied bacteriologically after death. Cultures were made from lung cavities and from the kidneys, liver, and bronchial glands.

In case No. 3096 both the pneumococcus and the streptococcus were found in the lung cavity. The pseudodiphtheria bacillus was found in the kidneys.

In case No. 3405 the streptococcus and colon bacillus were found in the cavity and the pseudodiphtheria bacillus in the kidney and the streptococcus, staphylococcus albus, and bacillus coli communis in the bronchial glands.

In case No. 3435 the pneumococcus, streptococcus, staphylococcus albus, and a sarcina were found in the cavity and the pneumococcus and streptococcus were found in the kidney.

In case No. 3440 the colon bacillus alone was found in the liver.

In case No. 3589 the pneumococcus, pseudodiphtheria bacillus, bacillus coli communis, staphylococcus albus, and a sarcina were found in the lung cavity and no micro-organisms were gotten from the rest of the body.

In case No. 3432 the streptococcus and bacillus lactis aërogenes were found in the lung cavity and no other micro-organisms were obtained.

In case No. 3215 the streptococcus, staphylococcus aureus, pseudodiphtheria bacillus, and colon bacillus were grown from the lung cavity and the colon bacillus from the liver.

A comparison of the bacteriological findings at autopsy with the findings in the sputum and hemorrhages shows some consistency.

In case No. 3096 the pneumococcus was found in the expectorated blood in both hemorrhages and was cultured in one. The streptococcus was found in the expectorated blood of one hemorrhage and cultured in the other. Both the pneumococcus and streptococcus were found in the lung cavity and the pseudodiphtheria bacillus was found in the kidney.

In case No. 3405 the streptococcus was found in the stained expectorated blood of both hemorrhages; the pseudodiphtheria bacillus was cultured from the blood of both hemorrhages; the streptococcus was cultured from the blood of one hemorrhage;

and *cladothrix dichotoma* was cultured from the blood of one hemorrhage. At autopsy the streptococcus and the colon bacillus were grown from the cavity in the lungs and the pseudodiphtheria bacillus from the kidney.

In case No. 3435 the streptococcus was found in the blood-stained sputum and the pneumococcus was recovered from the blood of the injected mouse. No micro-organisms were discovered in expectorated blood, either by staining or on culture. After death the pneumococcus, streptococcus, staphylococcus albus, and a sarcina were grown from the lung cavity and the pneumococcus and streptococcus from the kidneys.

In case No. 3440 the streptococcus was found in the stained expectorated blood and the streptococcus and staphylococcus aureus were cultured. At autopsy only the colon bacillus was grown and that from the liver.

In case No. 3589 the pneumococcus and streptococcus were found in the stained expectorated blood. The pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, colon bacillus, and a sarcina were grown from the lung cavity and no other micro-organisms were recovered.

In case No. 3432 (with no hemorrhage or blood-streaked sputum) the washed sputum was injected into a mouse on 6—15—'05. No pneumococcus was recovered from the mouse. At autopsy the streptococcus and bacillus lactis aërogenes were recovered from the cavity and no other micro-organisms were grown.

In case No. 3215 (with no hemorrhage or blood-streaked sputum) the washed sputum injected on 9—12—'05 into a mouse failed to show the pneumococcus. At autopsy the streptococcus, staphylococcus aureus, pseudo-diphtheria bacillus, and colon bacillus were recovered from the lung cavity and the colon bacillus from the liver.

Of the eight cases studied which came to autopsy, six had hemorrhages and two did not. Of the six which had hemor-

rhages, five had a bacteriological study made after death. Of the six hemorrhagic cases which came to autopsy, the pneumococcus was found in the stained expectorated blood in three; was cultured from the expectorated blood in one; was recovered from the injected mouse by staining in none, and by culture in one. In the majority of the cases, however, there is no record as to whether or not the culture and inoculation were made. In the five cases in which a bacteriological study was made at autopsy the pneumococcus was recovered from the lung cavity in three, and from the kidney in one. Of the two non-hemorrhagic cases which came to autopsy, the pneumococcus was not found anywhere before or after death.

Of the six hemorrhagic cases which came to autopsy the streptococcus was found at autopsy in the lung cavity in three, in the kidney in one, and in the bronchial glands in one. It had been found in blood-stained sputum in one case and in expectorated blood in five cases. It was found at autopsy in the lung cavities of both of the non-hemorrhagic cases, but not in the other organs of these cases.

The pseudodiphtheria bacillus was found at autopsy in three of the hemorrhagic cases—in one in the lung cavity and in two in the kidney—and in one of the non-hemorrhagic cases in the lung cavity. It had been cultured from the expectorated blood of one of the hemorrhagic cases.

Conclusions cannot be drawn from the facts so far presented. A few suggestions crop out. The pseudodiphtheria bacillus occurs very frequently in hemorrhagic cases of tuberculosis. In this series it was found in five (60%) of the cases cultured at autopsy. It was also found in one non-hemorrhagic case. The streptococcus occurred in four out of the five cases (80%). It was found in both of the non-hemorrhagic cases. The pneumococcus was found in three out of the five cases (60%), but not in any of the non-hemorrhagic cases.

LAWRENCE F. FLICK.

THE KIDNEYS IN TUBERCULOSIS.

A PATHOLOGICAL AND CLINICAL STUDY OF ONE HUNDRED AND ONE KIDNEYS FROM CASES OF TUBERCULOSIS OF THE LUNGS COMPARED WITH FORTY-FOUR CASES OF NON-TUBERCULOSIS.

The present study has had three preliminary presentations, each a little further advanced than the preceding. For each study all the specimens have been reviewed, and the conclusions now set forth are the fruits of three years' work.

The report on this subject in the Second Annual Report of the Phipps Institute emphasized particularly the percentage of cases dying of pulmonary tuberculosis presenting tubercles in the kidneys (58%), and showed that these tubercles had no influence on the general kidney condition, and, vice versâ, that the general kidney condition had no influence on the development of tubercles; the present report deals more particularly with the general condition found.

The various forms of nephritis found in the hundred and one kidneys in cases of tuberculosis of the lungs were:

Cloudy swelling.....	2
Cloudy swelling and chronic focal interstitial nephritis.....	9
Acute parenchymatous nephritis.....	13
Acute parenchymatous nephritis and chronic focal interstitial nephritis,....	28
Acute diffuse nephritis and chronic focal interstitial nephritis.....	2
Chronic parenchymatous nephritis.....	5
Chronic parenchymatous nephritis and chronic focal interstitial nephritis, ..	26
Chronic general interstitial nephritis.....	1
Chronic general interstitial nephritis and chronic focal interstitial nephritis, ..	8
Amyloid degeneration, cloudy swelling, and chronic focal interstitial nephritis,	1
Amyloid degeneration and chronic parenchymatous nephritis.....	1
Amyloid degeneration, chronic parenchymatous nephritis, and chronic focal interstitial nephritis.....	2
Amyloid degeneration, chronic general interstitial nephritis, and chronic focal interstitial nephritis of right kidney; ulcerative tuberculosis of left kidney.....	1
Ulcerative tuberculosis of left kidney; acute parenchymatous nephritis of right kidney.....	1
Ulcerative tuberculosis of right kidney; chronic general interstitial nephritis of left kidney.....	1
Total.....	101

Of the forty-two cases of acute parenchymatous nephritis, only two showed sufficient desquamation of epithelial cells in the lumen of the convoluted tubules to be dignified by the name acute desquamative nephritis. The remaining forty showed only degeneration and necrosis of the cells and granular debris in the lumen, and would, therefore, correspond to an acute degenerative nephritis. Of the thirty-four cases of chronic parenchymatous nephritis, only three could be called desquamative, the remaining thirty-one being of the degenerative variety. Seven of these thirty-one showed only a mild grade of nephritis.

In the forty-four cases of non-tuberculosis the diagnosis was as follows:

Cloudy swelling,.....	2
Acute parenchymatous nephritis,.....	3
Acute parenchymatous nephritis and chronic focal interstitial nephritis,...	1
Chronic parenchymatous nephritis,.....	4
Chronic parenchymatous nephritis and chronic focal interstitial nephritis, ..	2
Chronic general interstitial nephritis,.....	5
Chronic general interstitial nephritis and chronic focal interstitial nephritis,	20
Chronic general interstitial nephritis and carcinoma,.....	1
Chronic general interstitial nephritis, chronic focal interstitial nephritis, and pyæmic abscesses,.....	2
Chronic general interstitial nephritis and hypernephroma,.....	2
Amyloid degeneration, chronic general interstitial nephritis, chronic focal interstitial nephritis, and carcinoma,.....	1
Pyæmic abscesses and arteriosclerosis, ...	1
Total,.....	44

Of the four cases of acute parenchymatous nephritis, one showed sufficient desquamation to be called desquamative nephritis; the remaining three cases were degenerative in character and of a mild grade. All six cases of chronic parenchymatous nephritis were degenerative.

A specimen was described as acute parenchymatous nephritis when it showed distinct cloudy swelling, more or less degeneration and necrosis of the epithelium, and the lumen of the convoluted tubules contained granular debris or desquamated epithelium; as acute diffuse nephritis when it showed degeneration and necrosis of the epithelium and considerable general interstitial infiltration with round cells; as chronic parenchymatous nephritis when it showed degeneration and necrosis of the epithelium with some general thickening of the interstitial tissue and the lumen of the convoluted tubules contained desquamated epithelium or granular debris; as chronic general interstitial nephritis when the thickening of the interstitial tissue was gen-

erally distributed and predominated the degenerative changes in the epithelium; as chronic focal interstitial nephritis when the thickening of the interstitial tissue was localized.

This focal interstitial nephritis is a form of nephritis not usually described, yet after a careful study it appears to me to be of importance.* The size of the areas of focal interstitial nephritis varied considerably in the same and in different kidneys; they were found in the pyramids as well as in the cortex, though the diagnosis of chronic focal interstitial nephritis was made only when they occurred in the cortex. In size these areas varied from the extremes of 0.25 mm. to 4 or 5 mm., and were commonly 0.5 to 2 mm. in diameter. In them were found the appearances usually seen in chronic general interstitial nephritis, namely dilated tubules with atrophic epithelium, hyaline casts, shrunken and fibroid Malpighian bodies, and marked thickening of the interstitial tissue and of Bowman's capsule.

Macroscopically, these chronic focal interstitial areas are seen as whitish or yellowish specks on the surface of the kidneys or immediately under or near the investment on section. They quite resemble tubercles in their appearance, and were more than once mounted and stained under this impression. Microscopically they look like healed or healing tubercles, though they never show giant cells and only occasionally what appears like a small amount of caseation.

It is possible that the idea might arise that these focal interstitial areas are small healed infarcts, but it must be remembered that although they occur most frequently immediately under the investment, they are also found scattered through the cortex.

In some cases the number of focal interstitial areas is so large,

*A similar study of practically the same kidneys without insistence on focal interstitial nephritis may be found in the Transactions of the Second Annual Meeting of the National Association for the Study and Prevention of Tuberculosis, held in Washington, May, 1906.

and consequently their approximation so close, that it is difficult to decide whether we have to do with a focal or general interstitial condition. For this reason three of the cases diagnosed last year as general interstitial nephritis are classed this year, after further study, under focal interstitial nephritis. That focal interstitial nephritis may become so generalized as to be indistinguishable from general interstitial nephritis I have no doubt, and hence have diagnosed two of the eleven cases of chronic general interstitial nephritis in cases of tuberculosis, and two out of the thirty-one cases of the same in cases of non-tuberculosis as chronic general interstitial nephritis developing from chronic focal interstitial nephritis.

These focal interstitial conditions were found in association with all forms of nephritis, and in such numbers that they can be definitely said to be independent of the general nephritis. Classing the chronic focal interstitial conditions found in tuberculosis by themselves, we have:

Cloudy swelling and chronic focal interstitial nephritis,.....	10
Acute parenchymatous nephritis and chronic focal interstitial nephritis,....	28
Acute diffuse nephritis and chronic focal interstitial nephritis,.....	2
Chronic parenchymatous nephritis and chronic focal interstitial nephritis,...	28
Chronic general interstitial nephritis and chronic focal interstitial nephritis,.	9

In other words, omitting the associated conditions, we find chronic focal interstitial nephritis in seventy-seven out of one hundred and one cases (77%).

Taking the cases of non-tuberculosis and classifying the chronic focal interstitial conditions, we find:

Acute parenchymatous nephritis and chronic focal interstitial nephritis,....	1
Chronic parenchymatous nephritis and chronic focal interstitial nephritis,...	2
Chronic general interstitial nephritis and chronic focal interstitial nephritis,.	23

In other words, omitting the associated conditions we find chronic focal interstitial nephritis in twenty-six out of forty-four cases of non-tuberculosis (59%).



Case No. 2676. Below is a large tubercle (with four giant cells) extending to the investment in what appears like an area of chronic focal interstitial nephritis. In the upper right-hand corner is an area of chronic focal interstitial nephritis not connected with the tubercle. These chronic focal interstitial areas were found not only under the investment, but scattered through the cortex.

Since it is commonly allowed that in chronic general interstitial nephritis the thickening may be more evident in some places than in others, it is worth while noticing that, omitting the chronic focal interstitial nephritis associated with the chronic general interstitial nephritis from both categories, we find chronic focal interstitial nephritis in sixty-eight out of one hundred and one cases of tuberculosis (68%) and in three out of forty-four cases of non-tuberculosis (8%); or omitting the chronic general interstitial nephritis entirely we find chronic focal interstitial nephritis in sixty-eight out of ninety cases of tuberculosis (76%) and in three out of thirteen cases of non-tuberculosis (23%).

Considering only the kidneys from cases of tuberculosis, we find two kidney conditions represented which have always been acknowledged to be dependent on the tuberculosis, namely, ulcerative tuberculosis and amyloid degeneration. Of the former, we have three cases (3%), two with ulcerative involvement of the left kidney and one of the right. These three cases showed the typical large ulcerative cavities. In the two cases with ulcerative involvement of the left kidney, the right showed an acute parenchymatous nephritis once and chronic general interstitial nephritis with chronic focal interstitial nephritis and amyloid degeneration once; in the one case with ulcerative involvement of the right kidney, the left showed chronic general interstitial nephritis.

In the five cases of amyloid degeneration associated conditions of cloudy swelling with chronic focal interstitial nephritis were found once, of chronic parenchymatous nephritis once, of chronic parenchymatous nephritis with chronic focal interstitial nephritis twice, and of chronic general interstitial nephritis with chronic focal interstitial nephritis and ulcerative tuberculosis once.

In the kidneys from cases of tuberculosis we find acute parenchymatous nephritis occurring alone (except for tubercles) fourteen times. Since it is very likely that this acute condition is the result of the terminal condition (in many cases an acute

STATISTICS OF KIDNEYS IN TUBERCULOUS CASES.	CLOUDY SWELL- ING.		CLOUDY SWELL- ING.		ACUTE PAREN- CHYMATOUS NE- PHRITIS.		ACUTE PAREN- CHYMATOUS NE- PHRITIS.		ACUTE DIVORSE NEPHRITIS.		CHRONIC PAREN- CHYMATOUS NE- PHRITIS.		CHRONIC PAREN- CHYMATOUS NE- PHRITIS.		CHRONIC GENE- RAL INTERSTI- TIAL NEPHRITIS.		CHRONIC GENE- RAL INTERSTI- TIAL NEPHRITIS.		TOTAL.	
	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.			
Sex.....	28	33	10	4	17	11	1	1	1	1	3	3	17	11	2	9	67	34		
Age in years, ...	57, 27, 64, 18, 20, 57, 16, 47	20, 34, 14, 34, 23, 21, 6, 22, 34, 37	14, 28, 28, 19	14, 28, 28, 19	27, 25, 27, 28, 42, 30, 55, 33, 38, 18, 25, 38, 31, 52, 42, 33, 18	35, 45, 36, 10, 32, 42, 28, 40, 35, 48, 28	22	31	27, 33, 26	20, 26	27, 33, 26	20, 26	43, 24, 17, 53, 35, 33, 53, 41, 32, 28, 45, 27, 17, 39, 46, 36, 29, 26, 28, 36	38, 35, 25, 20, 38, 32, 37, 18, 35, 35, 22	38, 49	35, 24, 27, 53, 41, 32, 29, 33, 44	35, 24, 27, 53, 41, 32, 29, 33, 44	Youngest, 6 yrs. Oldest, ... 64		
Average age, ...	38	27	24	22	33	35	22	31	29	28	29	28	33	31	44	35	35	Average age, ... 32		
Nationality, { United States, ...	2	2	5	2	7	3	1	1	1	2	2	2	7	3	2	7	7	Total, ... 46		
{ Ireland, ...	2	2	3	1	7	4	2	2	2	1	2	1	7	6	2	2	2	 35		
{ Germany, ...	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	 13		
{ Elsewhere, ...	2	2	1	1	1	2	2	2	2	2	2	2	3	2	2	2	2	 13		
Condition in { Married, ...	2	1	1	1	5	6	1	1	1	1	1	1	10	7	2	2	2	 38		
Life, ... { Single, ...	2	5	1	3	9	4	1	1	1	3	1	1	7	4	2	6	6	 53		
{ Widowed, ...	2	2	2	2	3	1	2	2	2	2	2	2	2	2	2	1	1	 10		
Occupation, { Inside Good, ...	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	 4		
{ Inside Bad, ...	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	 4		
{ Outside Good, ...	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	 16		
{ Outside Bad, ...	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	 11		
{ Housework, ...	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	 25		
{ Child, ...	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	 2		
Previous { Typhoid, ...	1	2	1	2	4	2	2	2	2	2	2	2	3	1	1	2	2	 22		
Diseases, { Rheumatism, ...	1	2	1	2	2	2	2	2	2	2	2	2	3	1	1	5	5	 24		
{ Pneumonia, ...	1	1	1	1	1	3	1	1	1	1	1	1	1	2	1	2	2	 11		
{ Scarlet Fever, ...	1	1	1	1	3	3	1	1	1	1	1	1	1	2	1	1	1	 14		
Family history of tuberculosis, ...	3	1	4	2	8	6	2	2	2	2	3	2	7	1	1	2	2	 40		
No family history of tuberculosis, ...	2	5	6	2	9	5	1	1	1	1	1	1	10	10	1	7	7	 61		
Probable duration of tuberculosis in years, ...	1, 1, 10, 10, 1, 15	3, 1, 3, 3, 7, 1, 1, 1, 1, 15	4, 1, 1, 0, 4, 10, 2, 4, 2, 2, 3, 1, 2, 5, 0, 2, 2, 8, 2, 8, 1	3, 3, 2, 2, 4, 2, 2, 10, 2, 2, 3, 2	6	12	6, 10, 1, 1, 7	18, 2, 2, 10, 3, 3, 17, 2, 3, 4, 1, 1, 6, 1	15, 1	6, 1, 1, 1, 1, 1, 15	6, 1, 1, 1, 1, 1, 15	6, 1, 1, 1, 1, 1, 15	18, 2, 2, 10, 3, 3, 17, 2, 3, 4, 1, 1, 6, 1	17, 3, 3, 4, 1, 1, 4, 1, 1, 4, 1, 1, 6, 1	15, 1	6, 1, 1, 1, 1, 1, 15	6, 1, 1, 1, 1, 1, 15	6, 1, 1, 1, 1, 1, 15	Average, ... 4 yrs.	
Average probable duration of tuberculosis in years, ...	1	6	2	2	3	3	6	12	6	3	5	3	5	4	8	5	3	Total, ... 44		
Heart, ... { Normal, ...	2	4	8	2	8	4	2	2	2	2	2	2	8	5	2	2	2	 38		
{ Dilated, ...	2	3	2	2	6	3	1	1	1	1	1	1	7	4	1	1	1	 8		
{ Hypertrophy, ...	2	1	2	2	1	4	2	2	2	2	2	2	2	1	1	3	3	 11		
{ Sclerosis, ...	2	1	2	2	1	4	2	2	2	2	2	2	2	1	1	3	3	 11		

* Two cases of acute parenchymatous nephritis with chronic focal interstitial nephritis had no occupation recorded.
† This sclerosis represents all the pathological conditions of the aortic and mitral valves and aorta.

infection), and since we are about to consider the forms of nephritis possibly due to the tuberculosis, we will omit them. Omitting, therefore, the two cases of pure cloudy swelling and the fourteen cases of pure acute parenchymatous nephritis we have eighty-five cases showing chronic changes.

Of these eighty-five cases, thirty-four showed chronic parenchymatous nephritis, eleven chronic general interstitial nephritis, and seventy-seven chronic focal interstitial nephritis. (The figures thirty-four, eleven, and seventy-seven added together equal more than eighty-five, on account of the association of chronic focal interstitial with chronic parenchymatous nephritis and chronic general interstitial nephritis.) In other words, the kidney conditions possibly influenced by the tuberculosis appear to be chronic parenchymatous and chronic focal interstitial nephritis.

In order to discover, if possible, further causes of the kidney condition, general statistics relative to age, sex, race, condition, occupation, family history, previous diseases, and the condition of the heart pathologically are given on the opposite page.

In these and the future tables the cases of amyloid degeneration and ulcerative tuberculosis are included under the general conditions which they manifested, for instance, acute parenchymatous nephritis, chronic parenchymatous nephritis, chronic interstitial nephritis.

In the comparison of the different kinds of nephritis in tuberculosis it will be seen that though the age period advances slightly from acute parenchymatous (average age thirty) to chronic parenchymatous (average age thirty-one), and advances evidently in chronic general interstitial nephritis (average age thirty-seven), the age for chronic focal interstitial nephritis (average age thirty-four) is comparatively low, and corresponds more with the average age of all the cases studied. In other words, though chronic general interstitial nephritis evidently requires years for its development, and is, therefore, probably dependent, in part at least, on general causes, chronic focal interstitial nephritis is not so

dependent on age, and is more likely, therefore, to be due to local causes.

The general influence of sex usually assumed is evident, namely, that all kinds of nephritis are equally common to both sexes except chronic general interstitial nephritis and ulcerative tuberculosis. There were eleven cases of chronic general interstitial nephritis, all in males, though among the one hundred and one tuberculous cases, sixty-seven were males (average age thirty-two) and thirty-four were females (average age thirty-one).

The reason for the freedom of the female from chronic general interstitial nephritis is usually attributed to freedom from hard work, alcoholism, and exposure. It will, however, be noted that the female is not at all exempt from chronic focal interstitial nephritis, the proportion of females with chronic focal interstitial nephritis being practically the same as that of males (74% to 77%). This furnishes further evidence that chronic focal interstitial nephritis is probably due to a local infection and not to general causes.

From the table it would appear that race had little influence on the kind of nephritis, though the number of the different kinds is too small to form an accurate judgment.

In order to make anything out of occupation it was found necessary to classify occupation under the heads "inside good," "inside bad," "outside good," "outside bad," "housework" and "children." Housework was made a special occupation on account of the large number following it, in fact, twenty-five out of the thirty-four females.*

*Under this head "housework" were classed housewives as well as domestics, since among the poor the housewife does all the housework, usually even the washing. The other classifications explain themselves. Under "inside good" were classed occupations requiring only intellectual work or short hours which were not confining, in which the work was light or the wages good, as school-teacher; under "inside bad" were classed occupations necessitating long hours, close confinement, or heavy work, as clerk, mill-hand, iron-worker, metal polisher; under "outside good" were classed occupations which were light or in which the individual was independent, like house-painter, driver,

Nothing was learned, however, in regard to kidney disease from the study of the occupation. The two patients with ulcerative tuberculosis followed the occupations of hospital porter and bartender; the five with amyloid degeneration followed the occupations of coppersmith, housework (two), machinist, and book-keeper; and the one of amyloid degeneration and ulcerative tuberculosis followed the occupation of laborer.

The various diseases tabulated preceded all the different forms of nephritis and apparently had little influence on the form. It is to be noticed that even scarlet fever preceded every variety of nephritis, except chronic general interstitial nephritis and ulcerative tuberculosis. No cases of scarlatinal nephritis were found, which was to be anticipated, since the scarlet fever occurred in all cases many years before.

Statistics are given on family history of tuberculosis because in these cases there is at least a possibility that the tuberculosis existed from very early life. Though it was thought that these statistics might show that an interstitial condition was more common in these cases, it failed to do so. In fact, the reverse proved true, namely, there were more cases of chronic general interstitial nephritis showing no family history of consumption (8 to 3). In other words, these statistics would seem to show that tuberculosis was somewhat antagonistic to chronic general interstitial nephritis.

This does not appear to be true of chronic focal interstitial nephritis. Of these cases, twenty-eight showed a family history, forty-nine did not, which is just about the general percentage of the total number of cases with and without a family history (40 to 61).

Heart conditions, except dilatation, which occurs immediately

traveling salesman; under "outside bad" were classed occupations paying poor wages, necessitating heavy work, associated with an irritating dust or tempting to alcoholism, as laborer, stevedore, stone-cutter, driver of beer wagon. The majority of cases have fallen under "inside bad," and naturally so, since the majority of patients among the poor follow this kind of occupation.

or shortly before death, and occasionally a certain amount of hypertrophy, are rare in connection with tuberculosis. The few cases of sclerotic endocarditis represented, as a rule, slight conditions, and are so divided up among the different forms of nephritis that it is evident the kidney condition had no influence on the heart and vice versa.

The statistics on the general conditions in connection with the kidneys from cases of non-tuberculosis are given on the opposite page.

From this table we find the following: The average age of the non-tuberculous cases (forty-seven) was considerably higher than that of the tuberculous cases (thirty-two), which would account to some extent for the greater number of cases of chronic general interstitial nephritis among the former, namely, thirty-one out of forty-four, in comparison with eleven out of one hundred and one among the tuberculous cases. Yet the youngest age for chronic general interstitial nephritis among the non-tuberculous cases (eighteen) is much younger than that among the tuberculous cases (twenty-four). Moreover, among the cases of non-tuberculosis there were twenty-two (average age forty-four) between the ages of thirty and fifty-five, of which eighteen (average age forty-four) had chronic general interstitial nephritis (82%), and among the cases of tuberculosis there were forty-three (average age thirty-nine) between the ages of thirty and fifty-five, of which eight (average age forty) had chronic general interstitial nephritis (19%). Or, to put it another way, the average age of the non-tuberculous cases with chronic general interstitial nephritis was fifty-one; of nineteen cases of non-tuberculosis over the age of fifty-one, fifteen (79%) had chronic general interstitial nephritis, and of seven cases of tuberculosis over the same age one (14%) had chronic general interstitial nephritis. In other words, no matter how stated in regard to age, the number of non-tuberculous cases with chronic general interstitial nephritis is very much greater than that of tuberculous.

STATISTICS OF KIDNEYS IN NON-TUBERCULOUS CASES.

STATISTICS OF KIDNEY IN NON-TUBERCULOUS CASES.	CLOUDY SWELL.		ACUTE PARENCHYMATOUS NEPHRITIS.		ACUTE PARENCHYMATOUS NEPHRITIS.		CHRONIC PARENCHYMATOUS NEPHRITIS.		CHRONIC PARENCHYMATOUS NEPHRITIS.		CHRONIC INTERSTITIAL NEPHRITIS.		CHRONIC INTERSTITIAL NEPHRITIS.		PYEMIC ABSCESS.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Sex.....	1	1	3	1	1	1	3	1	1	1	1	1	16	7	1	1
Age.....	2 mo.	1 mo.	37, 17, 85	14	20, 55, 53	37	30, 55, 53	69	57, 49, 50, 67, 33, 37, 63	90	54, 45, 46, 66, 66, 51, 67, 44, 68, 40, 66, 48, 30, 50	37, 57, 67, 44, 65, 61, 28	90	Youngest, 1 mo. Oldest, 69	90	M., 39. F., 19
Average age.....	2 mo.	1 mo.	26	14	43	37	43	69	50	50	51	50	Average age, 47. Total, 28	90	90	90
Nationality.....	1	1	3	1	1	1	1	1	1	1	1	1	10	4	1	1
Condition in Life.....	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1
Occupation.....	1	1	1	1	1	1	1	1	1	1	1	1	3	3	1	1
Previous Diseases.....	1	1	1	1	1	1	1	1	1	1	1	1	3	3	1	1
Heart.....	1	1	1	1	1	1	1	1	1	1	1	1	3	3	1	1

Moreover, the interstitial thickening in cases of general interstitial nephritis from cases of tuberculosis was not nearly so marked as in the cases from non-tuberculosis, in fact, in some of the former the pyramids, for instance, showed little or no increase in the interstitial tissue, while in the latter the pyramids as well as the cortex showed an evident and frequently a marked increase. The following table shows this:

CHRONIC GENERAL INTERSTITIAL NEPHRITIS.
INTERSTITIAL TISSUE IN PYRAMIDS.

	NORMAL.	SLIGHTLY INCREASED.	INCREASED.	MARKEDLY INCREASED.
In cases of tuberculosis,.....	1	5	4	1
In cases of non-tuberculosis, ...	1	0	17	13

A careful study of the occupation showed nothing that would account for the greater frequency of chronic general interstitial nephritis among the non-tuberculous cases, though it is true that the class of cases in the Phipps Institute (despite the fact that the cases must be destitute to gain admission) stands a little higher in the scale of life than the class found in the Philadelphia Hospital.

Among the non-tuberculous cases also the smaller number of females (eight out of twelve) showing chronic general interstitial nephritis as compared with the males (twenty-three out of thirty-two) is evident, though the difference is not so marked as among the tuberculous cases.

In regard to chronic focal interstitial nephritis in cases of non-tuberculosis the conclusions possible to be drawn are falsified by the very large proportion of chronic general interstitial cases, and the correspondingly small number of the other forms of nephritis, like acute and chronic parenchymatous.

It is interesting to note the microscopic findings in regard to the blood-vessels of the kidneys in the different forms of nephritis.

	TUBERCULOUS CASES.		NON-TUBERCULOUS CASES.	
	Total Number of Cases.	Blood-vessels Thickened.	Total Number of Cases.	Blood-vessels Thickened.
Cloudy swelling,.....	2	0	2	0
Cloudy swelling with chronic focal interstitial nephritis,.....	10	7	0	0
Acute parenchymatous nephritis,.....	14	1	3	0
Acute parenchymatous nephritis, chronic focal interstitial nephritis,.....	28	11	1	0
Acute diffuse nephritis, chronic focal interstitial nephritis,.....	2	1	0	0
Chronic parenchymatous nephritis,.....	6	2	4	1
Chronic parenchymatous nephritis, chronic focal interstitial nephritis,.....	28	12	2	2
Chronic general interstitial nephritis,.....	2	0	8	6
Chronic general interstitial nephritis, chronic focal interstitial nephritis,.....	9	4	23	18
Pyæmic abscesses,.....	0	0	1	1
Total,.....	101	38	44	28

As can be seen, the blood-vessels of the kidneys were thickened almost twice as often proportionately in cases of non-tuberculosis, which was to be expected on account of the larger number of cases of chronic general interstitial nephritis among the non-tuberculous.

Moreover, in the chronic focal interstitial conditions (studying them in the tuberculous cases, where we have the opportunity of separating them from the chronic general interstitial conditions) we find the blood-vessels more frequently thickened than in the conditions not showing chronic focal interstitial nephritis (43% to 18%); in other words, thickening of the blood-vessels seems to go more or less hand in hand with both chronic general and chronic focal interstitial nephritis.

A pretty complete macroscopic and microscopic study of all kidneys was made, but since the details have already been published in the Transactions of the Second Annual Meeting of the National Association for the Study and Prevention of Tuberculosis, only the conclusions drawn from these details are repeated, and several other tables added.

In regard to the macroscopic study, it was shown that, except in extreme cases, the weight of the kidneys, whether the capsule strips easily or with difficulty, whether the surface is smooth or granular, the consistency increased or decreased, or the cortex broader or narrower, adds nothing to the diagnosis of the pathological condition; in other words, except in extreme cases it is impossible to make a diagnosis from the macroscopic appearance of the kidney.

Further, a microscopic study of the pyramids shows that there is no relation between the increase of the interstitial tissue of the pyramids and increased consistency.

IN CASES OF TUBERCULOSIS.	CONSISTENCY.	INTERSTITIAL TISSUE IN PYRAMIDS.				
		Normal.	Slightly Increased.	Increased.	Markedly Increased.	Not Recorded.
Cloudy swelling, chronic focal interstitial nephritis,.....	Increased,.....	3	..	..	..	..
	Not recorded,.....	2	1	2	..	2
Acute parenchymatous nephritis,.....	Increased,.....	2	2	..	..	..
	Normal,.....	1	1	..	..	..
Acute parenchymatous nephritis, chronic focal interstitial nephritis,.....	Not recorded,.....	6	..	1	..	1
	Increased,.....	7	1.	4	1	..
Acute diffuse nephritis, chronic focal interstitial nephritis, ...	Normal,.....	1	..	..	..	..
	Decreased,.....	2	1	1	..	..
Acute diffuse nephritis, chronic focal interstitial nephritis, ...	Not recorded,.....	8	2	..	..	..
	Decreased,.....	..	1	..	..	..
Chronic parenchymatous nephritis,.....	Not recorded,.....	1	..	..	..	..
	Increased,.....	..	3	..	..	..
Chronic parenchymatous nephritis, chronic focal interstitial nephritis,....	Decreased,.....	2	..	..	..	..
	Not recorded,.....	..	1	..	..	..
Chronic general interstitial nephritis,....	Increased,.....	3	6	3	..	..
	Normal,.....	1	..	..	..	..
Chronic general interstitial nephritis, chronic focal interstitial nephritis,....	Decreased,.....	1	1	1	..	..
	Not recorded,.....	10	2	..	..	..
Chronic general interstitial nephritis,....	Increased,.....	..	1	..	..	..
	Not recorded,.....	..	..	1	..	..
Chronic general interstitial nephritis, chronic focal interstitial nephritis,....	Increased,.....	..	1	..	1	..
	Decreased,.....	..	1	1	..	..
Chronic general interstitial nephritis, chronic focal interstitial nephritis,....	Not recorded,.....	1	2	2	..	..
	Increased,.....	..	..	..	..	..

In the two cases of pure cloudy swelling the consistency was not recorded.

CLINICAL SYMPTOMS OF NEPHRITIS IN TUBERCULOSIS.

In regard to the clinical symptoms little has been added to the last paper. In the mean time two other cases have died, the urine of which had been examined for tubercle bacilli and injected into guinea-pigs.

One of these urines (No. 3207) showed no tubercle bacilli on staining, produced tuberculosis in the guinea-pig, yet the kidneys of the patient showed no tubercles; the other urine (No. 106) showed no tubercle bacilli on staining, produced tuberculosis in the guinea-pig, and the kidneys of the patient showed tubercles.

In other words, from the whole study so far (twelve cases) it would seem that the kidneys may contain tubercles, yet the bacilli excreted in the urine and found on staining be incapable of infecting guinea-pigs (one case), and, again, that living tubercle bacilli capable of infecting guinea-pigs may pass through the kidneys without the kidneys showing tubercles (four cases). It is to be remembered that these kidneys were cut into pieces $\frac{1}{16}$ to $\frac{1}{8}$ of an inch in diameter and every abnormality, no matter how slight, mounted and stained. The tubercle bacilli found in the urine in these cases were found after centrifugating 2000 c.c. of urine, and sometimes not then on the first examination, but only on the second or even third examination.

Emaciation as found at death in the cases of tuberculosis was considered in order to see if the kidney condition might have had any influence on it, but no influence was found. All of the cases—like, for instance, ulcerative tuberculosis of the kidneys and amyloid degeneration—which are associated with a protracted general disease showed emaciation; the cases which failed to show emaciation were usually those associated with acute tuberculosis. The two cases in which the kidneys showed only cloudy swelling were emaciated. As a rule, therefore, it may be said that the kidney condition had no influence on the emaciation.

In my first study of the urine, pain in the lumbar region appeared to be a reasonably common symptom in cases of tuberculosis; recently close questioning of forty-two cases of tuberculosis of the lungs showed it less commonly than I expected. The statistics are as follows: nineteen (45%) absolutely denied ever having any pain in the lumbar region; of these, one has died (No. 2977) and the kidneys showed acute parenchymatous nephritis with chronic focal interstitial nephritis; two (5%) confessed to weakness in the lumbar region, but no pain; seven (17%) confessed to pain on suggestion; of these, one has died (No. 3133) and the kidneys showed chronic parenchymatous nephritis; fourteen (33%) complained, without suggestion, of very severe pain, either continuous or intermittent, over a protracted period of time; of these, two have died and the kidneys showed in one case (No. 3355) acute parenchymatous nephritis and in the other (No. 3207) acute parenchymatous nephritis with chronic focal interstitial nephritis. The number of cases, however, in which we have had opportunity to study the kidneys is too small to warrant conclusions.

PATHOGENESIS OF NEPHRITIS IN TUBERCULOSIS.

The two kinds of nephritis commonly met with in cases of tuberculosis are chronic parenchymatous and chronic focal interstitial. So far, there are grounds only for a consideration of the pathogenesis of the latter.*

From the foregoing study, all the facts of which seem to point to chronic focal interstitial nephritis being the result of a local condition, we have been led to conclude that the most likely pathogenesis of chronic focal interstitial nephritis is local infection.

After my first study of the kidneys in tuberculosis I thought it was possible to attribute these focal interstitial areas to the

*For special literature on pathogenesis see "Second Annual Report of the Phipps Institute."

tubercle bacillus. They apparently represent healed inflammatory foci, and with the tubercle bacillus to account for them, I saw no reason to look further. In my own mind I had framed this pathogenesis: the general chronic parenchymatous nephritis so frequently found is probably due to the tuberculous toxin or to the toxin of the mixed infection, and the focal interstitial nephritis which sometimes eventuates in widespread interstitial nephritis is due to the bacillus itself. My conclusion was based on the reasoning that although we are ready to attribute a general sclerosis of organs, even of the lungs, to an indefinite cause,—like, for instance, an unknown toxin circulating in the blood,—we usually insist that a localized sclerosis must have been produced by a local cause, for instance, an acute abscess, an actinomycosis, a tuberculosis, a gumma, or a foreign body. I was further persuaded into the idea by the fact that we often find focal interstitial areas in the kidneys absolutely typical in appearance, and discover in other specimens that they are connected with and are definitely part of a tubercle. In other words, if the edge of a tubercle showing a tendency to heal exactly resembles a focal interstitial area, why may the typical focal interstitial areas not be tubercles in which the healing process keeps in advance of caseation or giant-cell formation?

Recent study, however, especially of the kidneys from non-tuberculous cases, has caused me to recede somewhat from this first position. The reason is evident. Out of the forty-one adult cases of non-tuberculosis I found focal interstitial areas resembling those seen in tuberculous cases twenty-six times; in other words, in 59% of cases of non-tuberculosis in comparison with 77% of cases of tuberculosis.

On first thought it might seem that the question as to whether or not these localized focal interstitial areas were produced by the tubercle bacillus could be easily settled by staining them for tubercle bacilli. Second thought, however, shows the fallacy of this, for even though they were caused by tubercle bacilli, at

the stage when they are recognizable as focal interstitial areas, the process is practically a healed one and the tubercle bacilli would have disappeared. Moreover, in my own experience with staining the kidneys of tuberculous cases for tubercle bacilli, when they were found they were evident in every part of the kidneys, I mean within the convoluted tubules, in the glomeruli, in the interstitial tissue, and in focal interstitial areas. Other investigators say the same, among whom may be mentioned Coffin, D'Arrigo, Futterer, and Hauser. In one case of non-tuberculosis with focal interstitial areas in the kidneys I stained three specimens for tubercle bacilli, and in another five, but found no tubercle bacilli.

I still believe, however, that these focal interstitial areas are due to a local infection, but allow that the infection may be other than tuberculosis, for instance, typhoid fever. Moreover, in cases of protracted tuberculosis, I believe the pathogenesis most apparent is the tubercle bacillus.

THE CASES IN DETAIL.

It will be noticed that usually two diagnoses are given of the kidney condition, one under the pathological diagnosis made by the pathologist, and one under the microscopic study of the kidneys made by the author and followed in the previous study. Sometimes the diagnoses of the kidney condition made by the pathologist and the author do not agree. This is due to two causes: first, in some cases (practically all, in fact, from the Philadelphia Hospital, and some from the Phipps Institute) the pathological diagnosis represents only the macroscopic diagnosis at autopsy; secondly, in the cases in which the pathological diagnosis is the microscopic diagnosis, like in the majority of the cases in which Dr. C. Y. White performed the autopsy, his and my diagnosis sometimes differed on account of the difference in our classification of kidney disease. For instance, oftentimes he

speaks of diffuse nephritis when I describe the condition as a parenchymatous nephritis with focal interstitial nephritis.

Again, in many cases tubercles were described macroscopically which microscopically proved to be only focal interstitial areas or other abnormalities.

In regard to the nationality, American means patient and ancestry born in the United States, Irish-American means patient born in the United States, ancestry in Ireland, etc. In the tables nationality means parental nationality. The probable duration of the disease represents the examining physician's opinion after taking the history and making the examination.

In a few cases that showed no chronic focal interstitial areas, areas of round-cell infiltration were found either under the kidney capsule or scattered through the cortex which appeared as if they might be the beginnings of a chronic focal interstitial process. Such areas were also found in thirty cases which showed a definite chronic focal interstitial nephritis. These areas of cellular infiltration probably represent areas of beginning chronic focal interstitial nephritis. They were not, however, diagnosed as chronic focal interstitial nephritis.

The cases of tuberculosis studied this year are given in full; the cases reviewed in last year's report are not repeated in full, but only in regard to the items omitted last year. The cases of non-tuberculosis are as complete as the records gave them.

TUBERCULOUS CASES.

Case No. 73. Age, thirty-eight. Female. Married. White. Irish. Entered hospital 2-1-'05; died 2-21-'05. Physician, Ravenel. Clinical diagnosis, tuberculosis of the lungs, intestines, and glands. Occupation, housework. Family history, not recorded. Previous disease, rheumatism. Alcoholism, not recorded. Probable duration of illness, seventeen years. Weight, highest, one hundred and thirty-nine pounds; before death, ninety-eight and three-quarter pounds. No edema. Bowels, 2-13-'05, very loose. Sputum, tubercle bacilli positive. Urine, 2-1-'05, acid, 1014, no sugar, albumin present, diazo positive. Heart, second pulmonic slightly accentuated. Pulse, 80 to 130; respiration, 22 to 36; temperature, 97° to 100°.

Autopsy, White. Pathological diagnosis, chronic tuberculosis of left lung with cavities and bronchopneumonia, miliary tuberculosis of right lung, amyloid spleen, amyloid liver with fatty changes, chronic interstitial nephritis, tuberculosis of intestines, chronic fibroid pleurisy, tuberculosis of the lymphatic glands and ulceration of the superficial subcutaneous tissue and skin. General appearance after death, emaciated. Heart, two hundred and seventy grams, normal. Intestines, jejunum contains irregular areas of congestion but no ulceration; ileum contains irregular areas of congestion and several small ulcers with irregular edges and tubercles on the base. Bladder, normal. Kidneys, left, two hundred and forty grams; right, two hundred and forty grams; normal shape, capsule strips with difficulty, surface granular, color pale pink, consistency firm, section-surface dull, opaque, color pale pink, cortex diminished, contain several small 1 mm. tubercles (yellowish and slightly caseous). The two kidneys cut into one hundred and sixty pieces; five tubercles in pyramids, two on surface of kidneys; four or five small cysts.

Microscopic study: Twenty-four specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli not congested, not vacuolated, one line or no space between glomerulus and capsule, space empty. Bowman's capsule thickened. Convuluted tubules, epithelium swollen, degenerated, and sometimes necrotic, lumen normal size and frequently filled with granular debris. Cortex not congested; hyaline casts especially in chronic focal interstitial areas, where they are very numerous. Medullary rays same as convuluted tubules. Interstitial tissue in cortex between chronic focal interstitial areas normal, but these areas so numerous as to make the interstitial tissue usually thickened. Blood-vessels normal. Pyramids not congested; interstitial tissue increased; numerous hyaline casts. Two typical tubercles with caseation and giant cells in cortex. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis, tubercles.

Case No. 106. Age, twenty-seven. Male. White. Single. American. Entered dispensary, 2-16-'03; entered hospital, 1-20-'04; died, 11-20-'05. Physician, Irwin. Clinical diagnosis, tuberculosis of lungs. Occupation, tailor. Family history, negative. Previous diseases, rheumatism, pleurisy. Patient alcoholic. Probable duration of illness, four years. Weight, highest, one hundred and forty-four pounds; on admission, one hundred and twelve pounds; before death, ninety-eight pounds. No edema. Bowels, regular. No arteriosclerosis. Sputum, tubercle bacilli present. Urine, acid, 1022, clear, no albumin, no sugar, diazo negative. Heart, second pulmonic

accentuated. Pulse, 80 to 120; respiration, 20 to 35, temperature, 97° to 102°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy (right side), chronic fibroid left side, chronic tuberculosis of lungs with cavity formation and caseation, congestion of larynx, calcification of thyroid vessels, amyloid liver with miliary tubercles, tuberculous enteritis, parenchymatous nephritis (slight grade), amyloid spleen with miliary tubercles, tuberculous tonsillitis with fibroid changes. General appearance after death, marked emaciation. Heart, dilated. Intestines, distended and numerous areas of congestion; lower part of ileum contains irregular and typical tuberculous ulcers. Bladder, normal. Seminal vesicles, not recorded. Kidneys, left, one hundred and eighty-six grams; right, one hundred and eighty-six grams; normal shape, capsule strips easily, surface smooth, pale, consistency softened, section-surface dull, opaque, pale, cortex thickened, few isolated tubercles. One kidney cut into eighty sections; numerous pin-point cysts; one cyst size of hazelnut; many small tubercles.

Microscopic study: Seventeen specimens in paraffin studied. Kidney investment normal or slightly thickened. Some Malpighian bodies closer to investment than normally. Glomeruli congested, slightly vacuolated, one line or no space between glomerulus and capsule, space sometimes contains a little yellowish pigment. Bowman's capsule usually normal, sometimes thickened. Convoluted tubules under investment dilated, lumen empty, epithelium atrophic, degenerated and sometimes necrotic; near pyramids dilated, lumen filled with débris, epithelium granular, degenerated, rarely necrotic. Cortex not congested; no casts. Medullary rays same as convoluted tubules near pyramids. Interstitial tissue in cortex not thickened. Blood-vessels normal. Typical focal interstitial areas under investment and throughout cortex. Pyramids congested; interstitial tissue slightly increased; a few hyaline casts. One tubercle with caseation and giant cells in pyramid, rest in cortex. Diagnosis, mild grade of acute parenchymatous nephritis, chronic focal interstitial nephritis, tubercles.

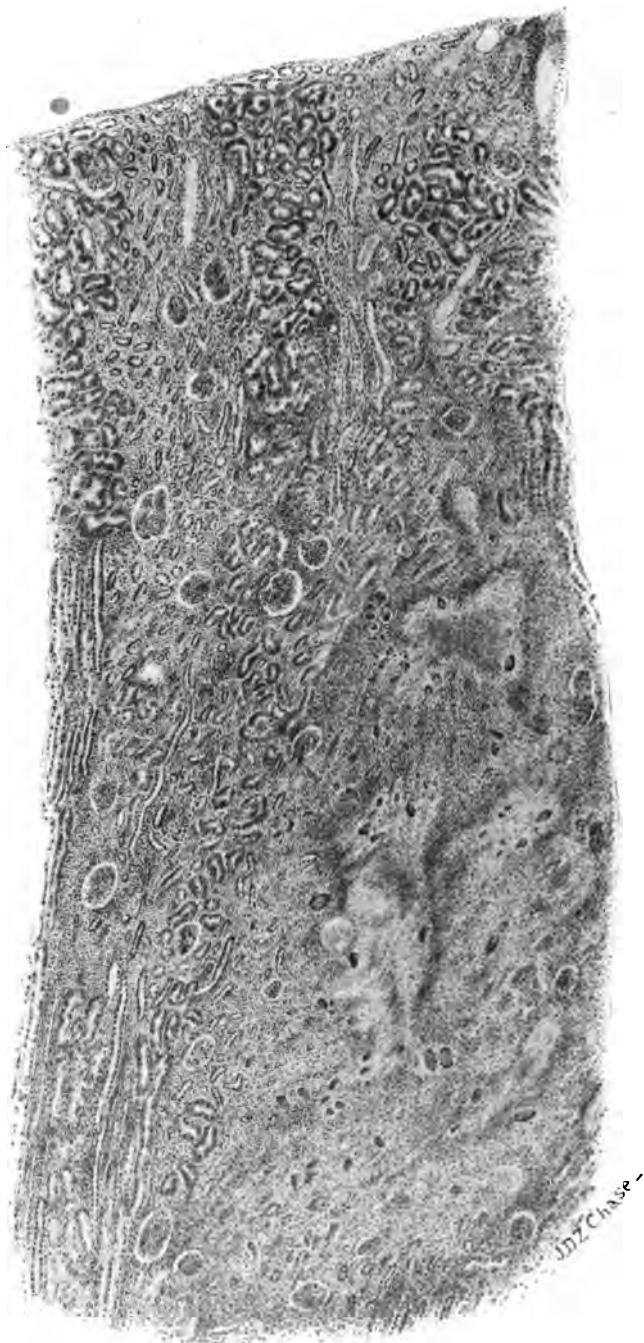
Case No. 302. Age, forty-three. Male. White. Married. Swede. Entered hospital 2-16-'05; died 2-20-'05. Physician, Walsh. Clinical diagnosis, tuberculosis of lungs. Occupation, machinist. Family history, negative. Previous diseases, pleurisy, influenza, measles, malaria. Patient alcoholic. Probable duration of illness, eighteen years. Weight, highest, one hundred and seventy-three pounds; before death, one hundred and forty-five and three-quarter pounds. Edema of legs and feet toward evening. Bowels, constipated. Sputum, tubercle bacilli positive. Urine, acid, 1028,

trace of albumin, diazo positive, leucocytes, a few granular casts and flat epithelial cells. Heart, moderate arteriosclerosis. Pulse, 100 to 130; respiration, 28 to 56; temperature, 97° to 104°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, chronic tuberculosis of lungs with cavity formation, miliary tuberculosis of liver, left kidney and spleen, tuberculosis of testicles with sinuses to scrotum, severe grade of toxic nephritis. General appearance after death, emaciated. Heart, three hundred and forty-one grams, left ventricle dilated. Intestines, a few irregular areas of congestion. Bladder, normal. Seminal vesicles, not recorded. Kidneys, left, one hundred and sixty grams; right, one hundred and fifty-five grams; normal shape, capsule strips easily, surface smooth, color pale, consistency softer than normal, section-surface dull, opaque, cortex slightly increased, pyramids normal. One and three-quarter kidneys cut into one hundred and sixty sections; numerous small cysts varying in size from pin-point to mustard-seed or rarely a split pea, almost all in pyramids, occasional one in cortex.

Microscopic study: Thirty-seven specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli slightly congested, vacuolated, quite a few hyaline fibroid, especially in focal interstitial areas, one line space between glomerulus and capsule. Bowman's capsule usually normal or slightly thickened; sometimes, especially in focal interstitial areas, markedly thickened, and in these cases frequently shows proliferation of epithelium as well as thickening of the connective tissue. Convolted tubules slightly dilated, epithelium markedly degenerated and necrotic, lumen frequently contains granular débris, but is usually empty. Medullary rays the same. Cortex not congested; many hyaline casts. Interstitial tissue in cortex between the focal interstitial areas and areas of round-cell infiltration normal, though these areas are so numerous that the interstitial tissue is usually increased. Blood-vessels usually normal, sometimes slight endarteritis. Pyramids not congested; interstitial tissue increased; a few hyaline casts. No tubercles. Diagnosis, chronic parenchymatous, which might be called with almost equal propriety chronic general interstitial nephritis, chronic focal interstitial nephritis.

Case No. 781. Age, thirty-five. Female. White. Married. Irish. Entered dispensary 9-2-'04; entered hospital 2-9-'05; died 9-6-'05. Physician, Landis. Clinical diagnosis, tuberculosis of lungs. Occupation, housework. Family history, negative. Previous diseases, not recorded. No alcoholism. Probable duration of illness, three years. Weight, highest, one hundred and thirty pounds; before death, one hundred and eight pounds.



Case No. 78r. In the upper part are two areas of chronic focal interstitial nephritis apparently connected with the tubercle below. These areas are possibly the result of the tubercle formation and the diagnosis chronic focal interstitial nephritis would not be made on them.

Edema of feet 9—30—'04; edema of legs 4—5—'05. Bowels 8—1—'05, loose; 8—2—'05, very loose; 8—31—'05, diarrhea uncontrollable. Sputum, tubercle bacilli negative. Urine acid, 1012, trace of albumin, suspicion of diazo. Heart, normal. Pulse, 100 to 150; respiration, 20 to 40; temperature, 96° to 102°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy right side, chronic apical pleurisy left side, chronic tuberculosis of lungs with cavity formation right lung, miliary tuberculosis left lung, tuberculous ulceration of larynx and trachea, sclerosis of posterior leaflet of mitral valve, miliary tuberculosis of liver with passive congestion, mild grade of diffuse nephritis, miliary tuberculosis of kidneys and spleen, tuberculous enteritis. General appearance after death, emaciated. Heart, two hundred and two grams, dilated. Intestines, upper part of tract shows light yellowish small areas of congestion, few small tuberculous ulcers in lower half and region of ileo-cæcal valve. Bladder, normal. Kidneys, left, two hundred and two grams; right, one hundred and seventy-two grams; normal shape, capsule slightly adherent, surface slightly granular, mottled, yellowish pink, consistency firm, section-surface dull, opaque, yellowish pink, cortex about normal, pyramids slightly decreased, few miliary tubercles. Two kidneys cut into one hundred and sixty sections; five tubercles in cortex, three in pyramids.

Microscopic study: Twenty-five specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli sometimes congested and vacuolated, sometimes not, usually one line space between glomerulus and capsule, sometimes two lines and rarely three lines space empty. Bowman's capsule normal except in focal interstitial areas where thickened. Convoluted tubules under investment dilated and contain only a small amount of granular débris; toward pyramids not dilated and filled with granular débris, epithelium degenerated and necrotic. Cortex usually not congested, here and there slight congestion; a few hyaline casts, a few epithelial casts, and a rare red blood cast in focal interstitial areas. Medullary rays same as convoluted tubules near investment. Interstitial tissue in cortex slightly thickened. Blood-vessels normal. A number of focal interstitial areas under investment and scattered throughout cortex. Pyramids congested; interstitial tissue slightly increased; a few hyaline casts. Typical tubercles with caseation and giant cells. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis, tubercles

Case No. 975. Age, nineteen. Male. White. Single. Irish. Entered dispensary 7—1—'03; entered hospital 12—18—'05; died 1—4—'06. Physician, Craig. Clinical diagnosis, tuberculosis of the lungs. Occupation,

tin-roofer. Family history, mother, two brothers, and one sister died of tuberculosis. Previous diseases, not recorded. No alcoholism. Probable duration of illness, one year. Weight, not recorded. No edema. Bowels, regular. Sputum, not recorded. Urine, not recorded. Heart, not recorded. Pulse, 90 to 150; respiration, 26 to 48; temperature, 97° to 103°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy left side, chronic fibroid pleurisy posteriorly apex to third rib right side, chronic tuberculosis of both lungs with cavity formation, bronchopneumonia of both lungs, atheroma of aorta, fatty liver with miliary tubercles and congestion, colloid goitre (slight grade), ulcerative enteritis, parenchymatous nephritis with miliary tubercles, miliary tuberculosis of spleen, tuberculosis of mesenteric and cervical lymphatic glands. General appearance after death, emaciated. Heart, ten ounces, normal. Small intestines contain small and large typical tuberculous ulcers with tubercles on serous membrane. Bladder, normal. Seminal vesicles, normal. Kidneys, left, five ounces; right, five ounces; slightly lobulated, capsule strips easily, smooth surface, yellowish red, consistency normal, section-surface dull, opaque, color reddish yellow, cortex about normal, pyramids normal. The two kidneys cut into one hundred and thirty-five pieces; eight suspicious small tubercles, two in pyramids, remainder in cortex.

Microscopic study: Seven specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli slightly congested, sometimes vacuolated, none fibroid, one line or no space between glomerulus and capsule, space always empty. Bowman's capsule normal. Convoluted tubules slightly dilated, epithelium degenerated, necrotic, fatty, lumen sometimes contains granular debris. Cortex congested; no casts. Medullary rays show no lumen, epithelium swollen, degenerated and necrotic. Interstitial tissue in cortex not thickened. Blood-vessels normal. No focal interstitial areas or areas of cellular infiltration under investment. Two or three areas of local round-cell infiltration throughout cortex. Pyramids congested; interstitial tissue slightly increased; no casts. Two typical tubercles with caseation and giant cells in cortex. These tubercles made up almost entirely of cells, no fibrous tissue. Two tubercles in pyramids. None of the tubercles show much fibrous tissue formation, though some show considerable caseation. The whole kidney condition appears recent. Diagnosis, mild grade acute parenchymatous nephritis, tubercles.

Case No. 1767. Age, thirty-five. Female. White. Married. English. Entered dispensary 11—21—'03; entered hospital 11—18—'04; died 2—12—'05. Physician, Landis. Clinical diagnosis, tuberculosis of lungs. Occu-

pation, school till fourteen, cigar factory six months, pharmaceutical manufactory eleven years, housewife seven years. Family history, brother and mother died of tuberculosis. Previous diseases, malaria, measles. No alcoholism. Probable duration of illness, three years. Weight, highest, one hundred and thirty-five pounds; on admission, one hundred and thirty pounds; before death, one hundred and eight and a half pounds. Edema of ankles. Bowels, regular. Sputum, tubercle bacilli positive. Urine, acid, 1016, no sugar, albumin present, diazo negative. Heart, normal. Pulse, 80 to 130; respiration, 22 to 36; temperature, 97° to 100°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy left side, chronic tuberculosis of left lung, acute miliary tuberculosis right lung with acute bronchopneumonia, acute appendicitis, diffuse nephritis. General appearance after death, well nourished. Heart, ten and one-half ounces, contracted, right side slightly dilated and filled with currant-jelly clot. Intestines, irregularly congested and moderately distended with gas, mucous membrane is irregularly congested, no ulcers, no miliary tubercles. Bladder, normal. Kidneys, left, six and one-half ounces; right, six and one-half ounces; normal shape, capsule strips with difficulty, surface granular and roughened, paler than normal, consistency firm, section-surface dull, opaque, pink but pale, cortex thin, pyramids normal, both very movable. The two kidneys cut into one hundred and sixty sections; two suspicious tubercles in cortex; three or four small cysts in pyramids.

Microscopic study: Nineteen specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, vacuolated, one line or no space between glomerulus and capsule. Bowman's capsule usually normal, sometimes slightly thickened. Convoluted tubules, lumen normal size, filled with granular debris, epithelium granular, degenerated and necrotic. Cortex slightly congested; a rare granular cast in a shriveled tubule. Medullary rays same as convoluted tubules. Interstitial tissue in cortex normal or very slightly thickened. Blood-vessels normal. Three or four focal interstitial areas under investment and throughout cortex. Pyramids congested; interstitial tissue increased; a rare tubule shows some desquamation. The two suspicious tubercles in cortex were a large focal interstitial area and an accumulation of round cells which looked like a tubercle but showed neither caseation nor giant cells. Diagnosis, acute parenchymatous nephritis, chronic focal interstitial nephritis.

Case No. 2481. Age, thirty-eight. Male. White. Widower. American. Entered hospital 11-11-'04; died 3-6-'05. Physician, Craig. Clinical diagnosis, tuberculosis of lungs, arteriosclerosis, cirrhosis of liver (with

questionable amyloid). Occupation, errand-boy, bartender two years, Pullman car conductor. Family history, brother died of tuberculosis. Previous diseases, typhoid, syphilis, measles, pertussis, diabetes. Patient alcoholic. Probable duration of illness, fifteen years. Weight, highest, one hundred and sixty-eight pounds; before death, one hundred and twelve pounds. No edema. Bowels, regular. Sputum, tubercle bacilli positive. Urine, acid, 1010, albumin, no sugar, no casts, diazo positive. Heart, negative. Pulse, 80 to 130; respiration, 20 to 38; temperature, 96° to 103°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, chronic tuberculosis of lungs with cavity formation, acute miliary tuberculosis of lungs, tuberculous laryngitis, chronic perihepatitis and fatty liver, tuberculous enteritis, tuberculous ulceration of kidney (right). General appearance after death, emaciated. Heart, nine ounces; dilated. Intestines, few small ulcers in lower half. Bladder, normal. Seminal vesicles, normal. Kidneys, left, nine and one-half ounces, compensatory enlargement, normal shape, capsule strips easily, smooth surface, pale yellowish pink, consistency firm, section-surface dull, opaque, cortex increased, pyramids normal, several small 1 to 2 mm. caseous tubercles; right, six and one-half ounces, contains a cavity one and a half by three-quarter inches at top, becoming narrower toward pelvis, greatly infiltrated, typical early stage of surgical kidney, caseous material in large area shows softening and a cavity. One kidney (left) cut into ninety sections.

Microscopic study of left kidney: Twelve specimens in paraffin studied. Kidney investment slightly thickened. Malpighian bodies a little closer to investment than normally. Glomeruli not congested, not vacuolated, one line space between glomerulus and capsule, sometimes no space, space almost always empty, once or twice filled with a few desquamated epithelial cells and once or twice filled with red blood-corpuscles. Bowman's capsule thickened. Convoluted tubules under investment, epithelium atrophic, lumen dilated; toward pyramids the epithelium is less atrophic and the lumen is usually filled with granular debris, hyaline casts, or red blood-corpuscles. Medullary rays, epithelium swollen, degenerated, lumen filled with debris and sometimes with red blood-corpuscles. Cortex here and there congested. Interstitial tissue in cortex markedly thickened. Blood-vessels normal. Pyramids congested; interstitial tissue slightly increased; hyaline and granular casts. One large infarct, in midst of which is seen a small amount of glandular tissue (1 mm. in diameter) resembling carcinoma. No tubercles found in this kidney, though many in right (surgical) kidney. Diagnosis, right kidney, ulcerative tuberculosis, left kidney, chronic general interstitial nephritis.

Case No. 2632. Age, twenty-four. Male. White. Married. Irish. Entered hospital 7-23-'04; died 9-6-'05. Physician, McCarthy. Clinical diagnosis, tuberculosis of lungs with cavity formation, left-sided pneumothorax, otorrhea, necrosis of left scapula. Occupation, bookkeeper. Family history, mother, father, and sister died of tuberculosis. Previous diseases, typhoid, measles, pertussis. Mother and patient alcoholic. Probable duration of illness, two years. Weight, highest, two hundred and nineteen pounds; on admission, one hundred and eighty pounds; before death, one hundred and fifty and one-quarter pounds. Edema of feet and ankles. Bowels, usually regular, occasional attacks of diarrhea. Sputum, tubercle bacilli positive. Urine, acid, 1015, no albumin, sugar, or diazo. Heart, normal. Pulse, 70 to 130; respiration, 18 to 44; temperature, 96° to 102°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy (both sides), localized empyema at left base, chronic tuberculosis of lungs with cavity formation (left side), miliary tuberculosis of right lung, fatty liver with miliary tubercles, tuberculous enteritis, tuberculosis of lymphatic glands, slight grade of parenchymatous nephritis, congestion of kidneys, miliary tubercles of kidneys and spleen, tuberculosis of adrenals, tuberculous sinus of back. General appearance after death, moderately emaciated. Heart, three hundred and seventy-two grams, dilated. Intestines, a few isolated ulcers with areas of deep congestion. Bladder, normal. Seminal vesicles, normal. Kidneys, left, two hundred and two grams; right, two hundred and two grams, lobulated, capsule strips easily, smooth surface, dark red, consistency firm, section-surface dull, dark red, cortex slightly thickened, pyramids normal, severe congestion. Two kidneys cut into one hundred and eighty sections; five very small suspicious tubercles found; numerous small cysts.

Microscopic study: Thirty-six specimens in paraffin studied. Kidney investment normal. Malpighian bodies sometimes closer to investment than normally. Glomeruli congested, not vacuolated, no space to one line space between glomerulus and capsule, sometimes the space contains a few desquamated necrotic epithelial cells. Bowman's capsule usually slightly thickened. Convoluted tubules, epithelium swollen, granular, fatty degenerated and necrotic, lumen usually filled with debris and desquamated epithelium. Cortex usually congested; hyaline casts about tubercles and focal interstitial areas. Medullary rays same as convoluted tubules. Interstitial tissue in cortex thickened, especially near investment. Blood-vessels normal, rarely slight thickening. Several small focal interstitial areas under investment and throughout cortex. Pyramids congested; interstitial tissue normal; no casts. Two typical tubercles with caseation and giant cells in cortex. Two other suspicious specks, diagnosed tubercles macroscopically, are large

focal interstitial areas under investment. One small cyst in cortex. Diagnosis, chronic parenchymatous nephritis, slight chronic focal interstitial nephritis. tubercles.

Case No. 2780. Age, twenty-five. Male. White. Single. Irish-American. Entered dispensary 10—6—'04; entered hospital 11—24—'04; died 3—6—'05. Physician, Walsh. Clinical diagnosis, tuberculosis of lungs with cavities. Occupation, bolt factory two and one-quarter years, outside two years, factory two years. Family history, mother died of tuberculosis. Previous diseases, marasmus, measles, mumps. Patient alcoholic. Probable duration of illness one year. Weight, highest, one hundred and thirty pounds; on admission, one hundred and twenty pounds; before death, ninety-five pounds. No edema. Bowels, regular. Sputum, not recorded. Urine, acid, 1018, diazo positive, no albumin, few epithelial cells. Heart, second pulmonic accentuated. Pulse, 120 to 140; respiration, 25 to 30; temperature, 99° to 102°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, chronic tuberculosis of lungs with cavity, acute miliary tuberculosis of liver and kidneys, toxic nephritis and cystic kidneys, fatty liver, tuberculous enteritis and laryngitis. General appearance after death, moderately emaciated. Heart, two hundred and ninety-five grams, contracted. Intestines, irregular areas of congestion, mucous membrane in the jejunum is bile-stained and congested, ileum is similar to jejunum, but contains several small 2 to 4 mm. ulcers in the lower part. Bladder, normal. Seminal vesicles, normal. Kidneys, left, one hundred and fifty-five grams; right, one hundred and forty grams; normal shape, capsule strips easily, smooth, pale pink, consistency softer than normal, section-surface dull, opaque, pale pink, cortex thickened, pyramids normal. Two kidneys cut into one hundred and eighty sections; three tubercles in cortex, three in pyramids, several cysts.

Microscopic study: Twenty-nine specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, markedly vacuolated, one to two lines space between glomerulus and capsule, space empty. Bowman's capsule normal. Convolted tubules dilated, lumen empty or contains a small amount of granular debris, epithelium somewhat atrophic, granular, degenerated, frequently necrotic; in some parts of the kidney the convoluted tubules near pyramids show epithelium swollen instead of atrophic. Cortex congested; no casts except in focal interstitial areas and tubercles. Medullary rays same as convoluted tubules generally. Interstitial tissue in cortex normal. Blood-vessels normal. No focal interstitial areas or areas of round-cell infiltration

under investment, but a number scattered throughout cortex. Pyramids not congested; interstitial tissue increased; a few hyaline casts. Typical tubercles with caseation and giant cells in cortex and pyramids. Diagnosis, acute parenchymatous nephritis, chronic focal interstitial nephritis, tubercles.

Case No. 2828. Age, seventeen. Male. White. Single. American. Entered dispensary 10—26—'04; entered hospital 4—11—'05; died 5—29—'05. Physician, McCarthy. Clinical diagnosis, tuberculosis of lungs. Occupation, worked in factory one year, driving delivery wagon four years. Family history, father died of tuberculosis. Previous diseases, influenza, measles, pertussis. No alcoholism. Probable duration of illness, two years. Weight, highest, one hundred and seventeen pounds; on admission, one hundred and fourteen pounds; before death, ninety and one-quarter pounds. No edema. Bowels, regular. Sputum, tubercle bacilli positive. Urine, acid, yellow, 1020, albumin, sugar, and diazo negative. Heart, second pulmonic and aortic accentuated. Pulse, 80 to 160; respiration, 15 to 45; temperature, 98° to 103°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, pneumothorax, chronic tuberculosis of lungs with cavity formation, cardiac hypertrophy, chronic valvulitis (mitral), tuberculous enteritis, diffuse nephritis with marked parenchymatous changes and tubercles, amyloid spleen with miliary tubercles, chronic tuberculous adenitis. General appearance after death, well nourished. Heart, contracted, slightly pushed to right, slight hypertrophy of the left ventricle, slight dilatation of both ventricles. Intestines, greatly distended with gas, mucous membrane pale, lower part of large intestines contains numerous small ulcers. Bladder, normal. Seminal vesicles, normal. Kidneys, left, two hundred and two grams; right, two hundred and seventeen grams; smooth surface, yellowish, soft consistency, section-surface dull, opaque, generally pale yellow, cortex greatly increased, pyramids about normal. Surface and section-surface contain a few small tubercles. One kidney cut into one hundred and thirty-five sections; no cysts.

Microscopic study; Seven specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli vacuolated, sometimes slightly congested, somewhat contracted, rarely fibroid, one line space between glomerulus and capsule, space empty. Bowman's capsule usually thickened. Convoluted tubules in focal interstitial areas frequently dilated, sometimes markedly so; in these the epithelium is atrophic and the lumen is sometimes filled with blood; convoluted tubules elsewhere, epithelium degenerated, under investment, fatty degenerated and frequently necrotic, with lumen containing granular debris but very little desquamation. Medullary rays like latter convoluted tubules. Cortex not

congested. Interstitial tissue in cortex generally not thickened, but there are so many localized focal interstitial areas that it is frequently thickened. Blood-vessels normal. Several focal interstitial areas under investment and quite a few localized areas scattered throughout cortex. The tubules in these areas are sometimes empty, sometimes contain hyaline casts, sometimes red blood-casts (really pigment casts from breaking up of red blood-corpuscles). Pyramids here and there congested, and in these areas the tubules sometimes contain blood; interstitial tissue normal; a rare hyaline cast. Some of the blood-vessels show a thickened adventitia. No tubercles. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis.

Case No. 2957. Age, thirty-five. Male. White. Single. American. Entered dispensary 12—5—'04; entered hospital 2—1—'05; died 2—5—'05. Physician, Walsh. Clinical diagnosis, tuberculosis of lungs with cavity formation, Landry's paralysis. Occupation, salesman six years (outside), clerk six years (inside), assistant librarian five years (inside). Family history, mother died of tuberculosis. Previous disease, pleurisy. Patient alcoholic. Probable duration of illness, six years. Weight, highest, one hundred and forty pounds; on admission, one hundred and fourteen and one-quarter pounds; before death, ninety-eight pounds. No edema. Bowels, regular. Sputum, tubercle bacilli positive. Urine, acid, 1025, no albumin, no sugar, diazo negative, a few red blood-corpuscles. Heart, normal. Pulse, 60 to 110; respiration, 20 to 30; temperature, 96° to 102°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy (obliterative both sides), chronic tuberculosis of lungs with cavity formation, hypertrophy of heart, atheroma of aorta, toxic nephritis and miliary tuberculosis of kidneys. General appearance after death, emaciated. Heart, two hundred and seventy-nine grams, hypertrophy of right and left ventricles. Intestines, jejunum shows small irregular areas of congestion, ileum contains two small ulcers. Bladder, normal. Seminal vesicles, normal. Kidneys, left, one hundred and seventy-one grams; right, one hundred and fifty-five grams; normal shape, capsule slightly adherent, surface slightly granular, pale pink, consistency softer than normal, section-surface dull, opaque, pale pink, cortex slightly increased, pyramids about normal. Two kidneys cut into one hundred and sixty sections; two small cysts; three tubercles in pyramids, three in cortex.

Microscopic study: Thirty-five specimens in paraffin studied. Kidney investment normal. Malpighian bodies closer to investment than normally. Glomeruli markedly congested everywhere, not vacuolated, many fibroid in focal interstitial areas; toward investment one line space between glomeru-

lus and capsule, sometimes two lines space; toward pyramids no space. Bowman's capsule thickened. Convoluted tubules under investment shrunken, dilated, epithelium atrophic, degenerated, disintegrated, lumen empty or contains a very small amount of granular debris or one or two desquamated epithelial cells or a few red blood-corpuscles; toward pyramids not dilated or only rarely so, epithelium swollen, granular, degenerated, necrotic, with lumen obliterated by the swollen epithelium or filled with granular debris. Medullary rays like latter convoluted tubules. Cortex slightly congested, especially in focal interstitial areas and areas of round-cell infiltration. Interstitial tissues in cortex thickened everywhere; in addition, there are numerous localized masses of connective tissue. Blood-vessels normal. Pyramids congested; interstitial tissue increased. Typical tubercles with caseation and giant cells in cortex and pyramids. In my opinion a chronic parenchymatous nephritis with focal interstitial areas developing to such an extent as to produce the picture of chronic general interstitial nephritis. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis, tubercles.

Case No. 3050. Age, twenty-five. Female. White. Married. Irish. Entered dispensary 1-9-'05; entered hospital 2-9-'05; died 3-5-'05. Physician, Landis. Clinical diagnosis, tuberculosis of lungs. Occupation, housework. Family history, brother died of tuberculosis. Previous diseases, pleurisy, influenza, measles. Patient alcoholic. Probable duration of illness, eight months. Weight, highest, one hundred and nineteen pounds; on admission, one hundred and fifteen pounds; before death, one hundred and four pounds. No edema. Bowels, constipated, 3-2-'05 marked diarrhea. Sputum, tubercle bacilli very numerous. Urine, 1-9-'05, negative. Heart, second pulmonic and aortic accentuated. Pulse, 120 to 160; respiration, 25 to 60; temperature, 97° to 104°.

Autopsy, White. Pathological diagnosis, chronic tuberculosis of lungs with cavities, chronic adhesive pleurisy (left side), fatty degeneration of liver, slight grade of toxic nephritis, tuberculosis of the tonsils, tuberculous ulceration of colon, tuberculosis of larynx. General appearance after death, moderately emaciated. Heart contracted. Intestines, upper half of large intestines contains numerous small ulcers, mucous membrane congested. Bladder, normal. Kidneys, left, one hundred and ninety-five grams; right, one hundred and ninety-five grams; normal shape, slightly lobulated, capsule strips easily, surface granular, pale pink, consistency firm, section-surface dull, opaque, pale, cortex slightly increased, pyramids normal, surface contains one small pin-point tubercle of slightly yellowish color. Two kidneys cut into one hundred and eighty sections.

Microscopic study: Fourteen specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli near investment slightly congested, vacuolated, usually one to two lines space between glomerulus and capsule; toward pyramids not congested, not vacuolated, usually no space between glomerulus and capsule, space empty, no glomeruli fibroid. Bowman's capsule thickened; no proliferation of epithelium. Convoluted tubules under investment dilated, epithelium normal in size or slightly atrophic, granular, degenerated, edges disintegrated, lumen empty or contains a small amount of granular debris; toward pyramids less dilated, epithelium somewhat swollen, more granular and lumen more frequently contains debris and occasionally several desquamated necrotic epithelial cells. Medullary rays like convoluted tubules near investment except they contain more granular debris and more frequently desquamated epithelium. Cortex not congested. Interstitial tissue in cortex thickened. Blood-vessels normal. One or two small, narrow, focal interstitial areas under investment; these, however, typical. No areas of round-cell infiltration under investment. Pyramids not congested; interstitial tissue slightly increased; a few hyaline casts. Several microscopic cysts. One small focal interstitial area resembling healed tubercle. No tubercles. Diagnosis, chronic parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. 3717. Age, twenty-seven. Male. White. Single. Irish. Entered hospital 2-1-'05; died 2-9-'05. Physician, Stanton. Clinical diagnosis, tuberculosis of lungs and larynx. Occupation, school till thirteen, breaker-boy eight years, no occupation six years. Family history, brother died of tuberculosis. Previous diseases, pleurisy, pneumonia, influenza, measles, pertussis, mumps. Patient alcoholic. Probable duration of illness, six years. Weight, highest, one hundred and fifty-six pounds; on admission, one hundred and twenty-nine pounds; before death, one hundred and eight and one-half pounds. No edema. Bowels, constipated. Slight arteriosclerosis. Sputum, tubercle bacilli positive. Urine, alkaline, 1032, trace of albumin, diazo positive, urates, epithelial cells, few leucocytes. Heart, second pulmonic markedly accentuated, second aortic moderately accentuated. Pulse, 120 to 140; respiration, 30 to 45; temperature, 97° to 102°.

Autopsy, White. Pathological diagnosis, chronic tuberculosis of lungs with cavity formation, toxic nephritis, tuberculous enteritis and laryngitis, chronic obliterative pleurisy, tuberculous appendicitis. General appearance after death, slightly emaciated. Heart, twelve ounces, right and left ventricle somewhat dilated. Intestines, several small ulcers in large intestines, largest about 0.5 cm in diameter. Kidneys, left, six ounces; right, seven and one-half

ounces; normal shape, capsule strips easily, smooth surface, pale pink, consistency firm, section-surface dull opaque, pale pink, paler than normal, cortex slightly increased. Two kidneys cut into one hundred and sixty sections; one suspicious tubercle in cortex, one in pyramids; eight small cysts less than split-pea size.

Microscopic study: Twenty-three specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli slightly congested, vacuolated, one line or no space between glomerulus and capsule, space empty, a rare one fibroid. Bowman's capsule slightly thickened. Convoluted tubules under investment slightly dilated, epithelium swollen, granular, degenerated, necrotic; toward pyramids the same except not dilated. Cortex not congested; a rare hyaline cast. Medullary rays same as convoluted tubules near pyramids. Interstitial tissue in cortex slightly thickened. Blood-vessels normal. No focal interstitial areas or areas of round-cell infiltration under investment. Pyramids slightly congested; interstitial tissue slightly increased; no casts. Typical tubercles with caseation and giant cells in pyramids and cortex. Diagnosis, chronic parenchymatous nephritis, tubercles.

Case No. 3120. Age, twenty-seven. Male. White. Married. Austrian. Entered hospital 2—2—'05; died 2—8—'05. Physician, Craig. Clinical diagnosis, tuberculosis of both lungs, questionable cavity at left apex. Occupation, coal-miner nine years, farmer in Austria, left school at ten. Family history, mother and one brother died of tuberculosis. Previous diseases, malaria, marasmus, influenza, measles, pertussis. Patient and father alcoholic. Probable duration of illness, one year. Weight, highest, one hundred and forty pounds; on admission one hundred and eight pounds; before death, one hundred and eight pounds. No edema. Bowels, constipated. No arteriosclerosis. Sputum, tubercle bacilli positive. Urine, 2—3—'05, acid, 1032, albumin present, diazo negative. Heart, normal. Pulse, 100 to 150; respiration, 30 to 50; temperature, 96° to 103°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy (adhesions), chronic tuberculosis of lungs (with cavity left side), miliary tuberculosis of lungs, marked anthracosis of both lungs, tuberculosis of intestines, slight interstitial nephritis. General appearance after death, slightly emaciated. Heart, normal. Intestines, distended with gas, ileum contains several small irregular ulcers. Kidneys, left, one hundred and sixty grams; right, one hundred and sixty grams; normal shape, capsule strips easily, surface pale pink, consistency firm, section-surface dull, opaque, pale, cortex slightly thinner,

no tubercles. Two kidneys cut into one hundred and sixty sections; two or three quite suspicious looking tubercles; no cysts.

Microscopic study: Twenty-two specimens in paraffin studied. Kidney investment in places thicker than normal. Malpighian bodies normally distant from investment. Glomeruli congested, slightly vacuolated, one line or no space between glomerulus and capsule, space empty. Bowman's capsule usually normal, rarely slightly thickened. Convoluted tubules immediately under investment slightly dilated, lumen empty, epithelium fatty degenerated and necrotic, elsewhere lumen normal or reduced in size, epithelium swollen, degenerated, and necrotic. Medullary rays like latter convoluted tubules. Cortex congested; no hyaline casts. Interstitial tissue in cortex not thickened. Blood-vessels usually normal, sometimes show slight endarteritis. Several small focal interstitial areas under investment and throughout cortex. No areas of round-cell infiltration under investment. Pyramids congested; interstitial tissue normal; no hyaline casts. No tubercles. Diagnosis, acute parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. 3133. Age, twenty-nine. Female. White. Separated. Irish-American. Entered dispensary 2-25-'05; entered hospital 3-8-'05; died 12-23-'05. Physician, Ravenel. Clinical diagnosis, acute tuberculosis of lungs. Occupation, paper-box maker. Family history, brother died of tuberculosis. Previous diseases, measles, pertussis, chicken-pox. No alcoholism. Probable duration of illness, two years. Weight, highest, one hundred and twenty-nine pounds; on admission, one hundred and twenty pounds; before death, eighty-one and one-half pounds. No edema. Bowels, regular. No arteriosclerosis. Sputum, tubercle bacilli positive. Urine, acid, 1018, trace of albumin, diazo positive, finely granular casts. Heart, second pulmonic and aortic accentuated. Pulse, 90 to 150; respiration, 20 to 60; temperature, 97° to 102°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy, chronic tuberculosis of the lungs with cavity formation, chronic tuberculous laryngitis, atheroma of aorta, amyloid liver with miliary tubercles, tuberculous enteritis, parenchymatous nephritis with miliary tubercles, amyloid spleen with miliary tubercles, tuberculous adenitis and tonsillitis. General appearance after death, emaciated. Heart, normal. Intestines, numerous small and large typical ulcers, numerous areas of congestion. Bladder, normal. Kidneys, left, five ounces; right, five ounces; normal shape, capsule slightly adherent, surface granular, pale, consistency firm, section-surface dull, opaque, yellowish red, cortex slightly diminished in thickness. The two kidneys cut

into one hundred and sixty sections; three positive and three suspicious tubercles, all in cortex; no cysts.

Microscopic study: Twenty-seven specimens in paraffin studied. Kidney investment slightly thickened. Malpighian bodies normally distant from investment. Glomeruli congested, vacuolated, one to two lines space between glomerulus and capsule, space empty. Bowman's capsule thickened. Convolute tubules, lumen normal or smaller, usually contains debris, epithelium swollen, granular, degenerated, sometimes necrotic. Medullary rays same as convolute tubules. Cortex not congested; no hyaline casts. Interstitial tissue in cortex slightly thickened. Blood-vessels sometimes show endarteritis. No focal interstitial areas or areas of round-cell infiltration. Pyramids slightly congested; interstitial tissue slightly increased; no hyaline casts. Typical tubercles with caseation and giant cells in cortex. Diagnosis, chronic parenchymatous nephritis, tubercles.

Case No. 3142. Age, twenty-six. Male. White. Married. Scotch-German. Entered hospital 3-1-'05; died 6-13-'05. Physician, McCarthy. Clinical diagnosis, tuberculosis of lungs. Occupation, bookkeeper seventeen to nineteen, clerical work nineteen to twenty-one, billiard-room twenty-one to twenty-six. Family history, father and one brother died of uremia. Previous diseases, pleurisy, rheumatism, mumps. No alcoholism. Probable duration of illness, three years. Weight, highest, one hundred and thirty-three pounds; on admission one hundred and one-half pounds; before death; ninety-six pounds. No edema. Bowels, regular. No arteriosclerosis. Sputum, tubercle bacilli positive. Urine, acid, 1020, no albumin, no sugar, diazo slight, few epithelial cells. Heart, second pulmonic and second aortic accentuated. Pulse, 80 to 140; respiration, 20 to 30; temperature, 98° to 104°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy, chronic tuberculosis of lungs with cavity formation and fibroid changes, dilatation of heart, atheroma of aorta, perihepatitis (localized), tuberculous enteritis, parenchymatous nephritis, amyloid spleen, tuberculous adenitis and tonsillitis. General appearance after death, moderately emaciated. Heart, right auricle dilated. Intestines, not recorded. Bladder, normal. Seminal vesicles, normal. Kidneys, left, one hundred and seventy grams; right, one hundred and seventy grams; normal shape; capsule strips easily, surface smooth, pink, consistency firm, section-surface dull, opaque, pink, cortex thicker than normal. One kidney cut into eighty sections; no cysts.

Microscopic study: Seven specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli occasionally congested, occasionally slightly vacuolated, one line space

between glomerulus and capsule. Bowman's capsule usually normal. Convoluted tubules under investment, lumen contains desquamated necrotic epithelium, epithelium slightly atrophic, otherwise normal; elsewhere lumen about normal in size, containing granular debris, epithelium somewhat swollen, cloudy, degenerated and necrotic. Cortex not congested; a few hyaline casts. Medullary rays the same as convoluted tubules. Interstitial tissue in cortex normal. Blood-vessels normal. Several focal interstitial areas under investment. No areas of round-cell infiltration. Pyramids congested; interstitial tissue normal. No tubercles. Diagnosis, acute parenchymatous nephritis.

Case No. 3156. Age, twenty-eight. Male. White. Single. American. Entered hospital 3—8—'05; died 3—9—'05. Physician, Hatfield. Clinical diagnosis, tuberculosis of lungs, chronic parenchymatous nephritis. Patient deaf, unable to obtain history. No edema. Bowels, regular. Sputum, not recorded. Urine, not recorded. Heart, not recorded. Pulse, 110; respiration, 50; temperature, 98°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, chronic tuberculosis of lungs with cavities, acute dilatation of heart, acute miliary tuberculosis of the spleen, liver, kidneys, tuberculous enteritis. General appearance after death, moderately well nourished. Heart, five hundred and four grams, dilated, and right side filled with currant-jelly clots. Intestines, ileum contains a few small ulcers, remainder of small intestine shows a few areas of congestion. Bladder, normal. Seminal vesicles, normal. Kidneys, left, two hundred and two grams; right, one hundred and seventy-nine grams; normal shape, capsule strips easily, surface smooth, pale, consistency softer than normal, section-surface dull, opaque, cortex pale, moderately increased, pyramids normal, few miliary tubercles. Two kidneys cut into one hundred and eighty sections; two suspicious tubercles found; one cyst on surface.

Microscopic study: Eighteen specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, vacuolated, usually no space, sometimes one line, rarely two lines, space between glomerulus and capsule, space sometimes contains a small amount of granular debris. Bowman's capsule usually not thickened, sometimes slightly thickened. Convoluted tubules dilated, epithelium atrophic, granular, degenerated, lumen frequently contains granular debris but no desquamated cells. Medullary rays same as convoluted tubules only the epithelium is swollen. Cortex congested. Interstitial tissue in cortex not thickened. Blood-vessels normal. Focal interstitial areas and areas of round-cell infiltration under investment and throughout cortex. Pyramids

slightly or not at all congested; interstitial tissue normal; a few granular and hyaline casts. No tubercles. Diagnosis, acute parenchymatous nephritis, chronic focal interstitial nephritis.

Case No. 3163. Age, fifty-three. Male. White. Married. Irish. Entered hospital 3—13—'05; died 8—31—'05. Physician, Craig. Clinical diagnosis, tuberculosis of lungs. Occupation, leather sorter twenty-five years, farmer previously. Family history, negative. Previous disease, influenza. Patient alcoholic. Probable duration of illness, ten years. Weight, highest, one hundred and eighty-five pounds; on admission, one hundred and forty pounds; before death, one hundred and nineteen and one-half pounds. No edema. Bowels, regular. Sputum, tubercle bacilli positive. Urine, acid, 1022, trace of albumin, questionable diazo, no casts, few epithelial cells; 7—25—'05, acid, 1018, trace of albumin, slight diazo, no sugar, few hyaline casts. Heart, moderate arteriosclerosis. Pulse, 80 to 130; respiration, 20 to 40; temperature, 97° to 102°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, chronic obliterative pleurisy, subacute miliary tubercles with emphysema of left lung, chronic tuberculosis of lungs with cavity formation, atheroma of aorta, slight congestion of liver, tuberculous enteritis, diffuse nephritis, slight congestion of spleen with tubercles, tuberculous adenitis, tuberculous tonsillitis. General appearance after death, moderately emaciated. Heart, four hundred and nineteen grams, dilated. Intestines, numerous large and small ulcers in region of ileocaecal valve, caecum contains a few small round ulcers. Bladder, normal. Seminal vesicles, normal. Kidneys, left, two hundred and fifteen grams; right, two hundred and fifteen grams, capsule slightly adherent, surface slightly granular, red brown, consistency firm, section-surface dull, opaque, red, cortex slightly decreased, pyramids normal. Two kidneys cut into one hundred and seventy sections; two tubercles, both in pyramids; numerous small cysts in pyramids filled with colloid material.

Microscopic study: Seventeen specimens in paraffin studied. Kidney investment in places thicker than normal. Malpighian bodies sometimes closer to investment than normally. Glomeruli congested, vacuolated, one to two lines space between glomerulus and capsule, space empty. Bowman's capsule usually normal, sometimes thickened. Convoluted tubules under investment slightly dilated, lumen contains a few desquamated, necrotic epithelial cells, epithelium slightly granular, fatty degenerated, sometimes necrotic; toward pyramids lumen normal, epithelium swollen, degenerated and sometimes necrotic, lumen sometimes contains two or three desquamated, necrotic epithelial cells. Medullary rays like convoluted tubules near pyramids.

Cortex not congested; hyaline casts especially in focal interstitial areas. Quite a few focal interstitial areas scattered throughout cortex, making the interstitial tissue in cortex more commonly thickened than normal; in fact, these focal interstitial areas are so numerous that the diagnosis of chronic general interstitial nephritis might be made without much impropriety. Blood-vessels normal. Pyramids congested; interstitial tissue increased; quite a few hyaline casts. Several small cysts containing colloid material in pyramids. What appeared like tubercles in pyramids were localized focal interstitial areas; one of these appears to be undergoing fatty change. No tubercles. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis.

Case No. 3182. Age, fourteen. Female. White. Single. American. Entered dispensary 3—26—'05; entered hospital 1—15—'06; died 1—27—'06. Physician, Craig. Clinical diagnosis, tuberculosis of the lungs. Occupation, school till 9—'05, home helping mother since. Family history, mother has tuberculosis. Previous diseases, pleurisy, measles, scarlatina, diphtheria, mumps, pertussis. No alcoholism. Probable duration of illness, six months. Weight, highest, one hundred pounds; on admission, ninety-seven pounds; before death, ninety-five and one-quarter pounds. No edema. Bowels, regular. Sputum, March tubercle bacilli negative, May tubercle bacilli negative, October tubercle bacilli positive. Urine, 10—'05, acid, 1022. Heart, second pulmonic and aortic accentuated. Pulse, 110 to 160; respiration, 32 to 52; temperature, 97° to 103°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, chronic tuberculosis of the lungs with cavity formation, bronchopneumonia, fatty liver, tuberculous enteritis, tuberculous appendicitis, diffuse nephritis with miliary tubercles, tuberculous adenitis with amyloid degeneration, amyloid degeneration of intestines, tuberculous laryngitis. General appearance after death, emaciated. Heart, nine ounces, dilated. Intestines, one small ulcer, generally congested. Bladder, normal. Kidneys, left, six ounces; right, five ounces; normal shape, capsule strips easily, surface smooth, consistency firm, section-surface dull, opaque, cortex about normal, pyramids normal. The two kidneys cut into one hundred and eighty-eight sections.

Microscopic study: Thirty-four specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, vacuolated, two lines space between glomerulus and capsule, space empty. Bowman's capsule normal; no proliferation or desquamation of epithelium. Convolved tubules under investment somewhat dilated, elsewhere lumen normal, epithelium swollen, degenerated, sometimes

fatty degenerated, necrotic, and frequently lumen shows desquamated epithelium. Two or three areas of cystic dilated tubules near investment. Cortex not congested; a rare hyaline cast. Medullary rays same as convoluted tubules. Interstitial tissue in cortex normal. Blood-vessels normal. No focal interstitial areas or areas of round-cell infiltration. Pyramids congested; interstitial tissue slightly increased; no casts. One epithelial cast in cortex. Diagnosis, mild grade acute parenchymatous nephritis.

Case No. 3207. Age, forty-five. Female. Black. Married. American. Entered dispensary 4—5—'05; entered hospital 5—30—'05; died 6—24—'05. Physician, Ravenel. Clinical diagnosis, tuberculosis of lungs and intestines. Occupation, cook for fifteen years. Family history, husband died of tuberculosis. Previous diseases, pleurisy, influenza, measles, mumps, chicken-pox. No alcoholism. Probable duration of illness, three years. Weight, highest, one hundred and forty pounds; on admission, one hundred and twelve pounds; before death, ninety and one-half pounds. No edema. Bowels, 5—30—'05, constipated; 6—7—'05, diarrhea. No arteriosclerosis. Sputum, tubercle bacilli positive. Urine, acid, 1010, trace of albumin; 5—31—'05, acid, 1014, trace of albumin, diazo positive. Heart, second pulmonic accentuated. Pulse, 100 to 130; respiration, 25 to 40; temperature, 98° to 102°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy both sides, chronic tuberculosis of lungs with cavity formation, miliary tubercles of liver, localized fibrous peritonitis, tuberculous enteritis, diffuse nephritis, miliary tubercles of spleen, tuberculosis of lymphatic glands. General appearance after death, emaciated. Heart, two hundred and sixty-four grams, contracted. Intestines, jejunum, lower part contains a few small, isolated, irregular tuberculous ulcers, ileum contains large number. Bladder, normal. Kidneys, left, one hundred and seventy-one grams; right, one hundred and seventy-one grams; capsule slightly adherent, surface granular, consistency firm, cortex slightly increased, pyramids normal, few small yellowish specks looking like miliary tubercles. One-half of one kidney cut; three suspicious tubercles; one or two pin-point cysts.

Microscopic study: Number of specimens not recorded. Kidney investment slightly thickened. Malpighian bodies normally distant from investment, rarely one close to investment. Glomeruli congested, not vacuolated, two lines space between glomerulus and capsule. Bowman's capsule normal. Convoluted tubules generally show lumen filled with granular debris, epithelium slightly atrophic, degenerated and necrotic. Cortex not congested. Medullary rays same as convoluted tubules. Interstitial tissue in cortex usually not thickened, but focal interstitial areas so numerous as to make it fre-

quently thickened. Blood-vessels normal. No areas of round-cell infiltration. Pyramids congested; interstitial tissue increased. One of the suspicious tubercles was a large blood-vessel, the others focal interstitial areas. No tubercles. Diagnosis, acute parenchymatous nephritis, chronic focal interstitial nephritis.

Case No. 3264. Age, fifty-seven. Male. White. Widower. Irish. Entered hospital 4-26-'05; died 11-9-'05. Physician, Stanton. Clinical diagnosis, tuberculosis of lungs, pleura, kidneys, and larynx. Occupation, errand-boy till twenty, then stevedore. Family history, negative. Previous diseases, typhoid, measles, pertussis. Patient alcoholic. Probable duration of illness, one year. Weight, highest, one hundred and sixty-nine pounds; on admission, one hundred and twenty-two pounds; before death, one hundred and thirty-one pounds. No edema. Bowels, 4-26-'05, constipated. Slight arteriosclerosis. Sputum, tubercle bacilli positive. Urine, acid, 1015, albumin present, diazo questionable, few hyaline casts, few leucocytes. Heart, second aortic accentuated. Pulse, 80 to 110; respiration, 25 to 45; temperature, 98° to 100½°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy, chronic tuberculosis of the lungs with cavity formation and edema, chronic tuberculosis of the larynx, atheroma of the aorta, amyloid liver with slight congestion, tuberculous enteritis, diffuse nephritis with few scattered tubercles, miliary tuberculosis of spleen, tuberculous adenitis. General appearance after death, moderately well nourished. Heart, three hundred and seventy-two grams, dilated, great dilatation of right auricle. Intestines, numerous large typical ulcers increasing in number as they near the ileocecal valve. Bladder, negative. Seminal vesicles, negative. Kidneys, left, two hundred and two grams; right, two hundred and two grams; surface granular, capsule adherent, normal shape, consistency firm, cortex diminished, section-surface dull, opaque, few isolated grayish miliary tubercles. The two kidneys cut into one hundred and sixty sections; several small cysts.

Microscopic study: Twenty specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli not congested, vacuolated, almost all show a small amount of hyaline material looking like amyloid, one to two lines space between glomerulus and capsule. Bowman's capsule slightly thickened. Convoluted tubules under investment dilated, lumen usually empty, epithelium atrophic, degenerated and necrotic, elsewhere lumen about normal in size, usually empty, epithelium usually slightly swollen, cloudy, degenerated and necrotic. Cortex not congested; many hyaline casts. Medullary rays like convoluted tubules

generally. Interstitial tissue in cortex usually not thickened except under investment and in focal interstitial areas. Blood-vessels usually normal, sometimes slightly thickened. Focal interstitial areas under investment. Areas of round-cell infiltration under investment. Pyramids not congested; interstitial tissue normal. No tubercles. Diagnosis, cloudy swelling, chronic focal interstitial nephritis.

Case No. 3355. Age, twenty-eight. Female. White. Single. American. Entered hospital 5-18-'05; died 8-4-'05. Physician, Landis. Clinical diagnosis, tuberculosis of lungs. Occupation, school till fourteen, house-work seven years, telephone operator two years, clerk eight months. Family history, negative. Nursed tuberculous case seven years ago. Previous diseases, pleurisy, measles, pertussis, scarlatina, chicken-pox. No alcoholism. Probable duration of illness, three years. Weight, highest, one hundred and twenty-five pounds; lowest, one hundred and three pounds; before death, eighty-seven and one-half pounds. No edema. Bowels, regular, loose two weeks before death. Sputum, tubercle bacilli positive. Urine, acid, 1030, no albumin, no sugar, diazo negative. Heart, second aortic accentuated. Pulse, 80 to 120; respiration, 15 to 35; temperature, 97° to 100°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy, chronic fibroid pleurisy, chronic tuberculosis of the lungs with cavity formation, bronchopneumonia and edema, valvulitis of the mitral leaflet, chronic vegetations, fatty infiltration, congestion and miliary tubercles of the liver, tuberculous enteritis, parenchymatous nephritis with miliary tubercles, congestion of spleen, tuberculous adenitis. General appearance after death, emaciated. Heart, four hundred and sixty-five grams, dilated. Intestines, moderately distended with gas and yellowish fecal matter, numerous large and small irregular tuberculous ulcers. Kidneys, left, one hundred and forty grams; right, one hundred and fifty-five grams; normal shape, surface granular, red brown, consistency firm, section-surface dull, opaque, red to pink, cortex slightly decreased, pyramids normal, capsule strips easily. The two kidneys cut into one hundred and sixty sections; one suspicious tubercle in center of pyramid; two small cysts twice size of pin-head in pyramids, one filled with brownish gelatinous material, the other with black gelatinous material.

Microscopic study: Twenty specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, vacuolated, rarely fibroid, one to two lines space between glomerulus and capsule, space usually empty, rarely a small amount of debris and one or two desquamated epithelial cells. Bowman's capsule slightly

thickened. Convoluted tubules near investment slightly dilated, lumen usually filled with granular debris, rarely a few desquamated epithelial cells, epithelium degenerated, sometimes fatty, frequently necrotic. Cortex slightly congested; rare hyaline cast. Medullary rays same as convoluted tubules. Interstitial tissue in cortex normal. Blood-vessels normal. No focal interstitial areas or areas of cellular infiltration throughout specimen. Pyramids slightly congested; interstitial tissue slightly increased; a few hyaline casts, especially near papillæ, one or two tubules near papillæ also show a few red blood-corpuscles. No tubercles. Diagnosis, mild grade acute parenchymatous nephritis.

Case No. 3220. Age, forty-two. Male. White. Married. German. Entered dispensary 4-12-'05; entered hospital 5-16-'05; died 5-18-'05. Physician, Hatfield. Clinical diagnosis, tuberculosis of lungs and larynx. Occupation, cabinet-maker. Family history, negative. Previous diseases, rheumatism, measles. No alcoholism. Probable duration of illness, four years. Weight, highest, one hundred and thirty-two pounds; on admission ninety-four and one-quarter pounds; before death, eighty-seven and one half pounds. No edema. Bowels, 4-12-'05, loose; 5-16-'05, constipated. Slight arteriosclerosis. Sputum, 5-17-'05, tubercle bacilli positive. Urine, not examined. Heart, second pulmonic accentuated. Pulse, 80 to 130; respiration, 25 to 45; temperature, 97° to 101°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy, chronic tuberculosis of lungs with cavity formation, chronic caseous pneumonia, ulcerative laryngitis, atheroma of aorta, slight congestion of liver, ulcerative enteritis, diffuse nephritis, slight congestion of spleen, tuberculous tonsillitis. General appearance after death, emaciated. Heart, three hundred and ten grams, dilated. Intestines, a few ulcers, small intestines distended with gas, mucous membrane somewhat congested. Bladder, normal. Seminal vesicles, normal. Kidneys, left, one hundred and eighty-six grams; right, one hundred and fifty-five grams; capsule strips with difficulty, surface slightly granular, consistency somewhat firm, section-surface dull, opaque, cortex not increased, glomeruli greatly congested, no tubercles. The two kidneys were cut into one hundred and sixty sections; many pin-point cysts; six or seven tubercles.

Microscopic study: Twenty specimens in paraffin studied. Kidney investment slightly thickened. Malpighian bodies normally distant from investment. Glomeruli congested, markedly vacuolated, one to two lines space between glomerulus and capsule. Bowman's capsule not thickened. Convoluted tubules generally slightly dilated, epithelium degenerated, dis-

integrated and necrotic. Cortex slightly congested. Medullary rays, epithelium swollen, degenerated, and sometimes necrotic. Interstitial tissue in cortex normal. Blood-vessels normal. Focal interstitial areas scattered throughout cortex and under investment. Pyramids slightly congested, interstitial tissue normal. Two typical tubercles with caseation and giant cells in cortex. Diagnosis, mild grade of acute parenchymatous nephritis, slight chronic focal interstitial nephritis, tubercles.

Case No. 3404. Age, thirty. Male. White. Single. Irish. Entered dispensary 6-1-05; entered hospital 6-10-05; died 6-15-05. Physician, Walsh. Clinical diagnosis, tuberculosis of lungs, bilateral cavity formation, anthracosis, left pneumothorax (acute). Occupation, coal driver twelve years, farmer in Ireland. Family history, one half-brother and one half-sister died of tuberculosis. No previous diseases. Patient alcoholic. Probable duration of illness, ten years. Weight, highest, one hundred and eighty-five pounds; on admission, one hundred and fifty pounds; before death, one hundred and thirty-eight and three-quarter pounds. Edema present. Bowels, regular. Slight arteriosclerosis. Sputum, tubercle bacilli positive. Urine, 6-11-05, acid, 1022, trace of albumin, diazo positive, a few white blood-corpuscles, a few epithelial cells, a few finely granular hyaline casts with white blood-corpuscles attached. Heart, second pulmonary accentuated. Pulse, 80 to 120; respiration, 25 to 35; temperature, 99° to 102°.

Autopsy, White. Pathological diagnosis, chronic tuberculosis of lungs with anthracosis, acute left side pneumothorax, chronic and acute pleurisy with adhesions, miliary tuberculosis of liver and kidneys (slight infection), tuberculosis of intestines (ulceration), tuberculosis of appendix, diffuse nephritis (early stages). General appearance after death, moderately well nourished. Heart, three hundred and fifty-seven grams, normal. Intestines, six to eight ulcers (3 to 4 mm.), several small clusters of miliary tubercles. Bladder, normal. Seminal vesicles, negative. Kidneys, left, two hundred and thirty-three grams; right, two hundred and thirty-three grams; somewhat flattened, capsule slightly adherent, surface granular, reddish brown, consistency firm, section-surface dull, opaque, cortex about normal. One kidney cut into forty sections; two pin-point cysts.

Microscopic study: Fifteen specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, slightly vacuolated, one to two lines space between glomerulus and capsule. Bowman's capsule thickened. Convoluted tubules, lumen normal in size, usually contains a small amount of granular debris, epithelium swollen, granular, degenerated and necrotic. Medullary rays same as con-

voluted tubules. Cortex congested; a few hyaline casts. Interstitial tissue in cortex normal. Blood-vessels normal. Focal interstitial areas under investment. No areas of round-cell infiltration. Pyramids somewhat congested; interstitial tissue increased; a few hyaline casts. No tubercles. Diagnosis, mild grade of acute parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. 3405. Age, thirty-three. Male. White. Single. Irish. Entered hospital 6—2—'05; died 6—14—'05. Physician, Hatfield. Clinical diagnosis, tuberculosis of lungs, intestines, and larynx. Occupation, carpenter eleven years, dyer and finisher eleven years. Family history, sister died of tuberculosis. Previous diseases, pneumonia, influenza, gonorrhea, measles, pertussis, mumps. Father and patient alcoholic. Probable duration of illness, ten years. Weight, highest, one hundred and forty pounds; before death, one hundred and three and one-half pounds. Edema at times. Bowels, loose. Moderate arteriosclerosis. Sputum, tubercle bacilli present. Urine, acid, 1025, no sugar, no albumin, suspicious diazo, epithelial cells, few hyaline casts. Heart, second pulmonic accentuated. Pulse, 100 to 140; respiration, 20 to 65; temperature, 98° to 101°.

Autopsy, White. Pathological diagnosis, chronic tuberculosis of lungs, chronic pleurisy right side, tuberculosis of intestines (ulceration), diffuse nephritis, tubercles of liver and spleen. General appearance after death, greatly emaciated. Heart, three hundred and seventy-two grams, dilated. Small intestines in places somewhat congested, several large and small ulcers. Bladder, normal. Seminal vesicles, normal. Kidneys, left, one hundred and fifty-five grams; right, one hundred and fifty-five grams; capsule strips easily, normal shape, smooth surface, reddish brown, consistency firm, cortex slightly increased, pyramids about normal, a few pale irregular areas, no typical tubercles, the parenchymatous tissue is swollen and paler than normal. Two kidneys cut into one hundred and sixty sections.

Microscopic study: Twenty-five specimens in paraffin studied. Kidney investment normal or slightly thickened. Malpighian bodies normally distant from investment. Glomeruli swollen, congested, sometimes vacuolated, one line or no space between glomerulus and capsule. Bowman's capsule normal. Convoluted tubules under investment usually somewhat dilated, lumen contains desquamated necrotic epithelium and granular matter, epithelium swollen, granular, degenerated, sometimes fatty degenerated and necrotic; in middle layer of cortex convoluted tubules show no lumen, epithelium swollen, granular and necrotic; toward pyramids same as under investment. Cortex not congested; a rare hyaline cast. Medullary rays sometimes the same

as convoluted tubules in middle layer, again as tubules under investment. Interstitial tissue in cortex slightly thickened. Blood-vessels normal. No focal interstitial areas or areas of round-cell infiltration. Pyramids not congested; interstitial tissue slightly increased; a rare hyaline cast. Diagnosis, chronic parenchymatous nephritis.

Case No. 3432. Age, twenty. Female. White. Single. American. Entered hospital 6—12—'05; died 8—19—'05. Physician, Craig. Clinical diagnosis, tuberculosis of lungs, questionable amyloid liver. Occupation, operator two years, housework two years. Family history, mother died of tuberculosis. Previous diseases, influenza, measles, pertussis. No alcoholism. Probable duration of illness, three years. Weight, highest, one hundred and seventeen pounds; on admission, one hundred and twelve pounds. No edema. Bowels, regular. Slight arteriosclerosis. Sputum, tubercle bacilli present. Urine, acid, 1020, one or two hyaline casts. Heart, marked accentuation of second pulmonic, slight accentuation of second aortic. Pulse, 100 to 150; respiration, 20 to 55; temperature, 96° to 103°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy, chronic tuberculosis of the lungs with cavity formation, tuberculous laryngitis, congestion of liver with tubercles, tuberculous enteritis and adenitis, parenchymatous nephritis with tubercles. General appearance after death, greatly emaciated. Heart, one hundred and seventy-one grams, dilated. Intestines, ulcers in large and small intestines, small intestines in places somewhat congested. Bladder, normal. Kidneys, left, one hundred and forty grams; right, one hundred and forty grams; greatly elongated, capsule strips with difficulty, surface granular, deep red, consistency firm, section-surface dull, opaque, deep red, cortex decreased in thickness, pyramids about normal. Two kidneys cut into one hundred and sixty sections; five tubercles in cortex, two near investment.

Microscopic study: Forty-one specimens in paraffin studied. Kidney investment normal. Malpighian bodies somewhat closer to investment than normally. Glomeruli congested, not vacuolated, usually no space between glomerulus and capsule. Bowman's capsule usually normal, sometimes slightly thickened. Convoluted tubules usually show no lumen, epithelium swollen, cloudy and sometimes necrotic. Medullary rays the same. Cortex congested; hyaline casts especially in focal interstitial areas. Interstitial tissue in cortex generally normal. Blood-vessels normal. One large and several small focal interstitial areas under investment and a number scattered throughout cortex. Pyramids congested; interstitial tissue normal; no casts. One of the apparent tubercles in cortex is a large typical focal interstitial area

filled with casts, the rest are true tubercles. One typical tubercle with caseation and giant cells in pyramids; three typical tubercles with caseation and giant cells in cortex. Diagnosis, cloudy swelling, chronic focal interstitial nephritis, tubercles.

Case No. 3435. Age, thirty-six. Female. White. Single. Irish. Entered hospital 6-13-'05; died 7-6-'05. Physician, Ravenel. Clinical diagnosis, tuberculosis of lungs and intestines. Occupation, housework three years, field work in Ireland previously. Family history, negative. Previous diseases, rheumatism, measles. No alcoholism. Probable duration of illness, two years. Weight, highest, not recorded; before death, ninety-five and one-quarter pounds. Edema of feet. Bowels, regular, inclined to constipation. Sputum, tubercle bacilli positive. Urine, acid, 1016, trace of albumin, diazo positive. Heart, second pulmonic accentuated. Pulse, 90 to 130; respiration, 30 to 50; temperature, 98° to 103°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy (left side, also right side with exception of extreme apex), chronic tuberculosis of lungs with cavity formation and edema, chronic fibroid peritonitis, chronic caseous tuberculosis of the peritoneum, tuberculous enteritis, tuberculous appendicitis, tuberculous salpingitis, tuberculous adenitis and tonsillitis. General appearance after death, emaciated. Heart, two hundred and twenty-seven grams, dilated. Intestines, ileum contains numerous two to six millimeter ulcers, irregular, with congested bases, bases contain miliary tubercles. Bladder, normal. Kidneys, left, one hundred and seventy-one grams; right, one hundred and seventy-one grams; normal shape, smooth surface, deep red, section-surface dull, opaque, deep red, slight thickening of cortex, pyramids normal, marked grade of acute nephritis, organs greatly congested, capsule strips easily, the parenchymatous tissue swollen and pale. The two kidneys cut into one hundred and sixty sections; streak extending from investment to pyramid looking like focal interstitial nephritis.

Microscopic study: Fourteen specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli swollen, vacuolated, sometimes congested, epithelium apparently fatty, one line space between glomerulus and capsule. Bowman's capsule normal except in focal interstitial areas, where it is thickened. Convoluted tubules, epithelium swollen, degenerated, necrotic, lumen filled with granular debris and sometimes desquamated necrotic epithelium; occasional hyaline casts in focal interstitial areas. Cortex congested, especially the middle part. Medullary rays same as convoluted tubules. Interstitial tissue in cortex normal. Blood-vessels normal. Several small focal interstitial areas and areas

of round-cell infiltration throughout cortex and under investment. Pyramids congested; interstitial tissue normal. The abnormality above mentioned macroscopically is a focal interstitial area. No tubercles. Diagnosis, acute parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. 3440. Age, twenty-six. Male. White. Single. English. Entered hospital 6—14—'05; died 8—11—'05. Physician, Craig. Clinical diagnosis, tuberculosis of lungs, questionable uremia, and meningitis. Occupation, school till eleven, teamster eleven years, structural iron-worker two and a half years. Family history, brother died of consumption. Previous diseases, pleurisy, gonorrhea, rheumatism, measles, pertussis, scarlatina, diphtheria, mumps, chicken-pox. Patient alcoholic. Probable duration of illness, sixteen months. Weight, highest, one hundred and sixty pounds; on admission, one hundred and twenty pounds; before death, one hundred and eight pounds. No edema. Bowels, constipated. Slight arteriosclerosis. Sputum, tubercle bacilli positive. Urine, acid, 1022, albumin present, diazo positive, few granular and waxy casts. Heart, second aortic slightly accentuated. Pulse, 100 to 140; respiration, 25 to 50; temperature, 99° to 104°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, chronic obliterative pleurisy, chronic tuberculosis of the lungs with cavity formation, tuberculous laryngitis, congestion of liver with miliary tubercles, tuberculous enteritis, appendicitis and adenitis, congestion of spleen with miliary tubercles, cloudiness of kidneys. General appearance after death, emaciated. Heart, normal. Intestines, numerous large irregular ulcers. Bladder, normal. Seminal vesicles, normal. Kidneys, left, one hundred and seventy-one grams; right, one hundred and seventy-one grams; normal shape, capsule strips with slight difficulty, smooth surface, pale, consistency softened, section-surface dull, opaque, cortex very slightly increased, pyramids normal. Two kidneys cut into one hundred and eighty sections.

Microscopic study: Six specimens in paraffin studied. Kidney investment normal or slightly thickened. Malpighian bodies normally distant from investment. Glomeruli congested, very slightly vacuolated, one line space or less between glomerulus and capsule, space empty. Bowman's capsule normal or slightly thickened. Convoluted tubules under investment, slightly dilated, and contain more or less desquamated epithelium; epithelium cloudy, degenerated, rarely necrotic; toward pyramids convoluted tubules show no lumen, epithelium swollen, cloudy, degenerated, and sometimes necrotic. Cortex not congested; a rare hyaline cast. Medullary rays same as convoluted tubules near pyramids, but with even less necrosis. Interstitial tissue in cortex slightly thickened. Blood-vessels normal. No focal interstitial

areas. Two or three areas of round-cell infiltration throughout cortex. Pyramids slightly congested; interstitial tissue normal; no casts. No tubercles. Diagnosis, chronic parenchymatous nephritis.

Case No. 3451. Age, twenty. Female. White. Married. Scotch-American. Entered hospital 6-17-'05; died 10-13-'05. Physician, Ullom. Clinical diagnosis, tuberculosis of the lungs, movable kidney on right. Occupation, mill operator three or four years, housework three years. Family history, three half-brothers died of hydrocephalus, four of cholera infantum. Previous diseases, measles, influenza, whooping-cough, chicken-pox. Father alcoholic. Probable duration of illness, four years. Weight, highest, one hundred and forty pounds; on admission, one hundred and three-quarter pounds; before death, one hundred and eight and one-half pounds. No edema. Bowels, regular; 7-15-'05, constipated. No arteriosclerosis. Sputum, tubercle bacilli positive. Urine, 7-1-'05, acid, 1016, trace of albumin, diazo negative, few hyaline casts, some white blood-corpuscles. Heart, second pulmonic accentuated. Pulse, 90 to 150; respiration, 25 to 70; temperature, 97° to 103°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, chronic tuberculosis of the lungs with cavity formation and edema, dilatation of heart, atheroma of aorta, fatty changes in liver with congestion and miliary tubercles, tuberculous enteritis, diffuse nephritis, tuberculous adenitis, tuberculous tonsillitis. General appearance after death, emaciated. Heart, four hundred and eighty-one grams, dilated. Intestines, congested, no ulcers. Bladder, normal. Kidneys, normal shape, capsule strips easily, surface smooth, consistency softened, section-surface dull, opaque, cortex moderately increased. Two kidneys cut into one hundred and sixty sections; several pin-point cysts; four or five suspicious areas.

Microscopic study: Nine specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, vacuolated, one to three lines space between glomerulus and capsule. Bowman's capsule slightly thickened. Convoluting tubules slightly dilated, lumen usually empty, epithelium degenerated and necrotic. Cortex not congested; hyaline casts in cortex. Medullary rays same as convoluting tubules. Interstitial tissue in cortex slightly thickened. Blood-vessels normal. One focal interstitial area under investment. Two or three focal interstitial areas throughout cortex. No areas of round-cell infiltration. Pyramids slightly congested; interstitial tissue slightly increased. No tubercles. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis.

Case No. 3474. Age, thirty-four. Female. White. Separated. United States. Entered hospital 6—26—'05; died 7—19—'05. Physician, Ravenel. Clinical diagnosis, tuberculosis of lungs, intestinal tuberculosis. Occupation, housework. Family history, negative. Previous diseases, typhoid, pleurisy, measles, scarlet fever, rheumatism. Father and patient alcoholic. Probable duration of illness, one year. Weight, highest, one hundred and seventy-six pounds; on admission, one hundred and eight pounds. No edema. Bowels, regular. Moderate arteriosclerosis. Sputum, tubercle bacilli positive. Urine, acid, 1010, trace of albumin, diazo positive, no sugar, some pus. Heart, normal. Pulse, 80 to 130; respiration, 25 to 40; temperature, 97° to 102°.

Autopsy, White. Pathological diagnosis, chronic and subacute fibroid pleurisy, chronic tuberculosis of lungs with cavity formation, fatty liver, tuberculous enteritis, chronic fibroid appendicitis, diffuse nephritis with miliary tubercles, congestion of spleen, tuberculous adenitis. General appearance after death, markedly emaciated. Heart, two hundred and thirty-one grams, dilated. Intestines, few ulcers in region of ileocaecal valve, also in caecum and ascending colon. Bladder, normal. Kidneys, left, one hundred and nine grams; right, one hundred and nine grams; normal shape, slightly lobulated, capsule slightly adherent, surface slightly granular, pale pink, consistency firm, section-surface dull, opaque, cortex diminished, one or two miliary tubercles. The two kidneys were cut into one hundred and sixty sections; two or three small pin-point cysts; one suspicious tubercle.

Microscopic study: Fifteen specimens in paraffin studied. Kidney investment normal. Malpighian bodies closer to investment than normally. Glomeruli slightly congested, not vacuolated, many fibroid, one to two lines space between glomerulus and capsule. Bowman's capsule usually thickened, sometimes markedly thickened. Sometimes Bowman's capsule and glomerulus one fibroid mass. Immediately under investment interstitial tissue is everywhere thickened and the convoluted tubules are few in number and somewhat atrophic. Elsewhere convoluted tubules show lumen filled with debris, the epithelium cloudy and slightly degenerated. Cortex not congested; many hyaline casts. Medullary rays same as convoluted tubules. Interstitial tissue thickened under investment, in focal interstitial areas quite evidently, elsewhere normal. Blood-vessels thickened. Many focal interstitial areas under investment and throughout cortex. Some areas of round-cell infiltration under investment and throughout cortex. Pyramids not congested; interstitial tissue normal; many hyaline casts. One area in pyramid of thickened connective tissue looking like a healed tubercle. No tubercles. Diagnosis, cloudy swelling, chronic focal interstitial nephritis.

Case No. 3499. Age, twenty-four. Male. Black. Single. American. Entered hospital 7-4-'05; died 8-1-'05. Physician, Stanton. Clinical diagnosis, tuberculosis of lungs, pleura, intestines, and peritoneum. Occupation, on farm till twenty, odd jobs since. Family history, negative. Previous diseases, pleurisy, influenza, syphilis, measles, pertussis, mumps, chicken-pox. No alcoholism. Probable duration of illness, three months. Weight, highest, one hundred and seventy pounds; on admission, not recorded. No edema. Bowels, regular. Sputum, tubercle bacilli negative. Urine, acid, 1024, slight diazo, no albumin, no sugar, urates, phosphates, epithelial cells. Heart, moderate arteriosclerosis. Pulse, 90 to 130; respiration, 25 to 35; temperature, 96° to 103°.

Autopsy, White. Pathological diagnosis, subacute obliterative pleurisy, acute miliary tuberculosis of the lungs, fibroid myocarditis, chronic peritonitis with subserous tubercles, acute miliary tuberculosis of the liver, diffuse nephritis with miliary tubercles, tuberculous adenitis, tuberculosis of the spleen with caseation. General appearance after death, emaciated. Heart, two hundred and thirty-one grams, dilated. Intestines, whole tract studded with countless numbers of small caseous tubercles, no ulcers. Bladder, not recorded. Seminal vesicles, normal. Kidneys, left, one hundred and seventy-one grams; right, one hundred and seventy-one grams; shape normal, slightly flattened, capsule strips easily, surface smooth, red brown, consistency firm, section-surface red brown, cortex slightly increased, pyramids normal, several small, hard, yellowish tubercles and several large, more or less diffuse tubercles. One half of one kidney cut into forty sections, rest of kidney preserved; numerous tubercles size of pin-head to pea; several pin-point cysts on surface.

Microscopic study: Twenty-three specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, vacuolated, one line or no space between glomerulus and capsule, space empty. Bowman's capsule slightly thickened; sometimes slight proliferation of the epithelium. In tubercles and focal interstitial areas Malpighian bodies fibroid. Convoluted tubules, lumen normal in size, usually empty, but sometimes filled with desquamated necrotic epithelium, epithelium swollen, degenerated, fatty, necrotic; in focal interstitial areas convoluted tubules dilated and filled with hyaline casts. Medullary rays like convoluted tubules generally. Cortex not congested. Interstitial tissue in cortex generally thickened, and markedly so in focal interstitial areas. Blood-vessels normal. Pyramids not congested; interstitial tissue slightly increased; no casts. Seven typical tubercles with caseation and giant cells, all in cortex. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis, tubercles.

Case No. 3519. Age, thirty-eight. Female. White. Single. American. Entered hospital 7-14-'05; died 9-22-'05. Physician, Ravenel. Clinical diagnosis, tuberculosis of lungs with cavity formation, of intestines. Occupation, saleswoman. Family history, negative. Previous disease, typhoid. No alcoholism. Probable duration of illness, one year. Weight, highest, one hundred and fourteen pounds; on admission, ninety-five pounds; before death, eighty-one pounds. No edema. Bowels, regular. Sputum, tubercle bacilli positive. Urine, acid, 1014, albumin present, diazo positive, sugar present, uric acid crystals. Heart, second pulmonic accentuated. Pulse, 90 to 140; respiration, 20 to 45; temperature, 98° to 103°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, chronic tuberculosis of the lungs with cavity formation, hemorrhages, tuberculous laryngitis, atheroma of aorta, fatty liver with marked congestion and tubercles, parenchymatous nephritis with tubercles, tuberculous enteritis, tuberculous appendicitis, tuberculous adenitis. General appearance after death, emaciated. Heart, seven and one-half ounces, contracted. Intestines, omentum slightly adherent to intestines and on left side adherent to peritoneum, no ulcers. Kidneys, left, six and one-half ounces; right, six and one-half ounces, normal shape, capsule strips easily, surface slightly indented, very slightly granular, redder than normal, consistency firm, section-surface glistening, smooth, moist, cortex not increased, pyramids somewhat increased. Two kidneys cut into one hundred and sixty sections; six suspicious looking tubercles; two or three small cysts.

Microscopic study: Twenty-seven specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, vacuolated, one fibroid, one line space between glomerulus and capsule, space usually empty, rarely three or four red blood-corpuscles in space. Bowman's capsule usually normal. Convolute tubules, lumen usually slightly dilated, sometimes smaller, lumen usually contains desquamated, necrotic epithelium and granular debris, epithelium swollen, granular, degenerated and necrotic. Medullary rays the same. Cortex congested; hyaline casts in focal interstitial areas. Interstitial tissue in cortex slightly thickened. Blood-vessels normal. Typical focal interstitial areas under investment. Pyramids congested; interstitial tissue slightly increased; no casts. One suspicious area was a blood-vessel, one a mass of connective tissue (possibly a healed tubercle), one typical tubercle with caseation and giant cells. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis, tubercles.

Case No. 3521. Age, fifty-five. Male. White. Widower. Irish. En-

tered hospital 7—15—'05; died 7—22—'05. Physician, Hatfield. Clinical diagnosis, chronic fibroid tuberculosis of lungs, delusions, insanity, chronic parenchymatous nephritis. Occupation, laborer three years, fireman sixteen years. Family history, negative. Previous diseases, typhoid, malaria, measles, and pertussis. Patient alcoholic. Probable duration of illness, three years. Weight, highest, one hundred and eighty-two pounds; on admission, one hundred and sixty pounds. No edema. Bowels, regular. Slight arteriosclerosis. Sputum, tubercle bacilli positive. Urine, acid, 1020, albumin present, no sugar, diazo positive. Heart, second pulmonic accentuated. Pulse, 120 to 140; respiration, 35 to 65; temperature, 98° to 102°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, chronic tuberculosis of the lungs with cavity formation, tuberculous laryngitis, dilatation of heart, sclerosis of aortic leaflet, fatty liver with congestion and miliary tubercles, gastropnoia, ptosis of colon, tuberculous enteritis, subacute appendicitis, diffuse nephritis, tuberculous adenitis. General appearance after death, emaciated. Heart, three hundred and fifty-seven grams, dilated right and left ventricle. Intestines, cæcum contains several large ulcers, mucous membrane of small intestines pale but otherwise normal. Bladder, normal. Seminal vesicles, normal. Kidneys, left, two hundred and two grams; right, one hundred and eighty-six grams; slightly elongated, capsule slightly adherent, surface slightly granular, pale, consistency firm, section-surface dull, opaque, pale pink, cortex slightly decreased, pyramids about normal. Two kidneys cut into one hundred and sixty sections; two slightly suspicious tubercles; a dozen very small cysts.

Microscopic study: Twenty-two specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli slightly congested, sometimes vacuolated, two lines space between glomerulus and capsule, space empty. Bowman's capsule usually more or less thickened. A few fibroid Malpighian bodies. Convolute tubules, lumen usually dilated and toward investment filled with desquamated epithelium, epithelium degenerated, necrotic and desquamated, some fatty degeneration; toward pyramids epithelium disintegrated and lumen frequently contains debris, but little desquamation; a rare tubule with blood in it. Cortex not congested; a rare hyaline cast. Medullary rays same as convolute tubules near pyramids. Interstitial tissue near investment slightly thickened, but not elsewhere in cortex except in focal interstitial areas. Blood-vessels normal. Pyramids congested; interstitial tissue markedly increased; no casts. Three very narrow areas of focal interstitial nephritis under investment. Several small areas of thickened interstitial tissue throughout cortex, especially about Malpighian bodies. Two areas (1 mm. in diameter) of round-

cell infiltration in cortex near pyramids looking like young tubercles, containing two hyaline and two pretty healthy Malpighian bodies and one thickened blood-vessel with beginning hyaline thrombus. In another specimen one of these areas is twice as large and looks like a pyæmic abscess, though the cells look rather like lymphocytes than polymorphonuclear. Dr. White says this is an undoubted tubercle. Diagnosis, acute parenchymatous nephritis, slight chronic focal interstitial nephritis, probable tubercles.

Case No. 3526. Age, thirty-three. Male. White. Single. United States. Entered hospital 7-18-'05; died 8-3-'05. Physician, McCarthy. Clinical diagnosis, tuberculosis of lungs, multiple neuritis. Occupation, driver of team. Family history, father and brother died of tuberculosis. Previous diseases, influenza, herpes zoster. Patient alcoholic. Probable duration of illness, nine months. Weight, highest, one hundred and sixty pounds; before death, one hundred and thirty pounds. Edema. Bowels, regular. Moderate arteriosclerosis. Sputum, not recorded. Urine, not recorded. Heart, second pulmonic accentuated. Pulse, 100 to 150; respiration, 35 to 45; temperature, 98° to 103°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, chronic tuberculosis of lungs with cavity formation, tuberculous laryngitis, fatty cirrhosis of liver, tuberculous enteritis, chronic fibroid appendicitis, parenchymatous nephritis, with miliary tubercles and cysts, congestion of spleen with miliary tubercles, tuberculous adenitis and tonsillitis. General appearance after death, emaciated. Heart, two hundred and seventy-one grams, normal. Intestines, moderate number of ulcers, majority large and irregular, congested. Bladder, normal. Seminal vesicles, normal. Kidneys, left, two hundred and seventy-one grams; right, two hundred and seventy-one grams; normal shape, capsule strips easily, smooth surface, red, consistency firm, section-surface dull, opaque, color red, cortex increased, surface contains several yellowish-white typical tubercles. The two kidneys cut into one hundred and sixty pieces; eight or nine suspicious looking specks like focal interstitial areas or tubercles under capsule.

Microscopic study: Seventeen specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli large, congested, rarely vacuolated, rarely fibroid, sometimes fill out capsule, sometimes one line space between glomerulus and capsule, sometimes the space contains a few desquamated necrotic epithelial cells or a little débris, though usually empty. One Malpighian body with somewhat shriveled glomerulus and thickened Bowman's capsule with some infiltration about it. Bowman's capsule usually normal, though thickened near investment. Con-

voluted tubules, epithelium granular, sometimes fatty degenerated, sometimes necrotic, lumen usually somewhat dilated and contains debris and desquamated epithelium. Cortex congested; no casts. Medullary rays same as convoluted tubules. Interstitial tissue in cortex normal except in focal interstitial areas. Blood-vessels usually normal, one artery shows some proliferation of intima. One small focal interstitial area under and joining investment. Scattered throughout cortex but not near investment are a number of small, well localized, focal interstitial areas showing thickening of interstitial tissue between half a dozen to a dozen tubules. One of the macroscopic tubercles was an area of thickened connective tissue in pyramid which does not look like a tubercle, another was a small focal interstitial area near investment, a third an area of infiltration near investment looking like a young tubercle containing one or two hyaline casts, the only casts seen. Pyramids congested; interstitial tissue normal; no casts. No tubercles. Diagnosis, mild grade acute parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. 3547. Age, thirty-eight. Male. White. Widower. American. Entered hospital 7—25—'05; died 9—11—'05. Physician, Walsh. Clinical diagnosis, tuberculosis of the lungs with bilateral cavity formation, of intestines, perihepatitis and perisplenitis. Occupation, bartender twelve years, milk hand, five years. Family history, wife died of tuberculosis. Previous diseases, gonorrhea, measles, scarlatina. Patient alcoholic. Probable duration of illness, two years. Weight, highest, one hundred and thirty pounds; on admission, one hundred and twenty-five pounds; before death, ninety-four pounds. No edema. Bowels, loose. Sputum, tubercle bacilli positive. Urine, acid, 1020, trace of albumin, no sugar, no diazo, hyaline casts, a few waxy casts, epithelial cells. Heart, normal. Pulse, 110 to 140; respiration, 25 to 45; temperature, 98° to 103°.

Autopsy, White. Pathological diagnosis, tuberculosis of lungs with cavity formation, tuberculous ulceration of intestines, fatty liver, tuberculous ulceration of trachea and larynx, parenchymatous nephritis. General appearance after death, emaciated. Heart, eight ounces, normal. Intestines, three ulcers in ileum, three small ulcers in large intestines. Bladder, normal. Seminal vesicles, normal. Kidneys, left, one hundred and thirty-five grams; right, one hundred and thirty-five grams; normal shape, capsule normal, surface smooth, color pale, consistency firm, section-surface glistening, color pale, slight thickening of cortex, pyramids normal, a few miliary tubercles. Two kidneys cut into one hundred and sixty sections; one suspicious looking tubercle; one pin-point cyst.

Microscopic study: Twenty-two specimens in paraffin studied. Kidney

investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, not vacuolated, rarely hyaline or fibroid, one to two lines space between glomerulus and capsule. Bowman's capsule slightly thickened. Convoluted tubules under investment, lumen slightly dilated, epithelium degenerated, sometimes desquamated and necrotic; same condition near pyramids; in middle area the lumen is obliterated by swelling of the epithelium, the epithelium is not so degenerated or necrotic. Cortex congested. An occasional hyaline cast in cortex. Medullary rays, epithelium swollen, degenerated and necrotic. Interstitial tissue in cortex usually normal, though on account of the large number of focal interstitial areas it is frequently thickened. Blood-vessels normal, rarely the intima is thickened. A few small focal interstitial areas scattered throughout cortex, but the majority are under the investment. Pyramids congested; interstitial tissue slightly increased; an occasional hyaline cast, one or two tubules filled with red blood-corpuscles. One typical tubercle with caseation and giant cells in cortex. Diagnosis, acute parenchymatous nephritis, chronic focal interstitial nephritis, tubercles.

Case No. 3548. Age, eighteen. Male. White. Single. Irish. Entered hospital 7—25—'05; died 2—12—'06. Physician, Walsh. Clinical diagnosis, tuberculosis of the lungs with bilateral cavity formation, Bell's palsy from otitis media, fistula in ano, tuberculosis of intestines. Occupation, paper-box operator two and a half years, liner of flour barrels nine months. Family history, mother died of tuberculosis. No previous diseases. No alcoholism. Probable duration of illness, five years. Weight, highest, ninety-four pounds; on admission, eighty-eight pounds; before death, seventy-eight and three-quarter pounds. No edema. Bowels, regular. Sputum, tubercle bacilli positive. Urine, acid, 1016, microscopic examination negative; 9—25—'05, acid, 1020. Heart, second pulmonic accentuated. Pulse, 80 to 140; respiration, 15 to 44; temperature, 98° to 104°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy (both sides), chronic tuberculosis of lungs with cavity formation, tuberculous laryngitis, atheroma of aorta, amyloid liver, tuberculous enteritis, chronic obliterative appendicitis, parenchymatous nephritis with amyloid degeneration, amyloid spleen with slight congestion, tuberculous adenitis, tuberculous tonsillitis. General appearance after death, greatly emaciated. Heart, two hundred and forty-eight grams, normal. Intestines, jejunum contains a rather large, old ulcer, ileum congested in areas but free from ulceration, the cæcum contains a few small ulcers. Bladder, normal. Seminal vesicles, normal. Kidneys, normal shape, capsule strips easily, surface smooth, color very yellow, section-

surface dull, opaque, color yellowish, consistency soft, cortex slightly increased, pyramids about normal. Two kidneys cut into one hundred and sixty sections.

Microscopic study: Twenty-nine specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli usually congested, some show hyaline material looking like amyloid, none fibroid, usually about one line space between glomerulus and capsule. Bowman's capsule normal or very slightly thickened. No proliferation of Bowman's epithelium, nor desquamation or exudation into capsular space. Convoluted tubules, epithelium swollen, fatty degenerated, desquamated and necrotic. Cortex not congested; no casts. Medullary rays same as convoluted tubules. Interstitial tissue in cortex normal. Blood-vessels normal. One small focal interstitial area found under investment with a few hyaline casts in it; another focal interstitial area with cystic dilated tubules under investment. No areas of round-cell infiltration. Pyramids congested; interstitial tissue normal; no casts. Certain tubules in pyramids show desquamation of epithelium. No tubercles. Diagnosis, mild grade acute parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. 3559. Age, twenty-six. Female. White. Single. American. Entered hospital 7-13-'05; died 8-10-'05. Physician, Craig. Clinical diagnosis, tuberculosis of lungs. Occupation, chambermaid and waitress. Family history, negative. Previous disease, mumps. No alcoholism. Probable duration of illness, one year. Weight, highest, one hundred and thirty-eight pounds; no other weight recorded. Edema of ankles and feet when she walks. Bowels, loose. Sputum, tubercle bacilli present. Urine, acid, trace of albumin, diazo positive, large number of white blood-corpuscles. Heart, normal. Pulse, 100 to 160; respiration, 30 to 60; temperature, 98° to 102°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, chronic tuberculosis of lungs with cavity formation, dilatation of heart with slight ventricular hypertrophy, miliary tubercles in liver, tuberculous enteritis, parenchymatous nephritis, congestion of spleen, tuberculous adenitis and tonsillitis. General appearance after death, well nourished. Heart, right and left ventricle slightly dilated. Intestines, numerous large and small tuberculous ulcers, increasing in number near the ileocaecal valve. Bladder, normal. Kidneys, normal shape, slightly lobulated, capsule slightly adherent, surface slightly granular, color pale, consistency soft, section-surface dull, opaque, color pale, cortex slightly increased, pyramids about normal. Two kidneys cut into one hundred and fifty sections.

Microscopic study: Fifteen specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment.

Glomeruli congested, vacuolated, two to three lines space between glomerulus and capsule, space usually empty, but not infrequently contains, especially near investment, a number of necrotic epithelial cells desquamated from either the capsule or the glomerulus, the edges of which in these cases are quite ragged. Bowman's capsule normal. Convoluted tubules, lumen normal or slightly dilated and frequently contains, especially near investment, desquamated necrotic epithelial cells or considerable granular debris; the epithelium is swollen, granular, degenerated, and necrotic; there is much more degeneration than desquamation. Cortex not congested; a rare hyaline cast. Medullary rays, epithelium swollen, granular, degenerated, and markedly necrotic, no lumen. Interstitial tissue in cortex slightly thickened. Blood-vessels normal. No focal interstitial areas or areas of round-cell infiltration under investment or elsewhere. Pyramids slightly congested; interstitial tissue normal; no casts. No tubercles. Diagnosis, chronic parenchymatous nephritis.

Case No. 3560. Age, thirty-two. Female. White. Married. Irish-American. Entered hospital 7-31-'05; died 9-16-'05. Physician, Ravenel. Clinical diagnosis, tuberculosis of lungs. Occupation, housework. Family history, negative. Previous diseases, measles, pertussis, mumps, chicken-pox. Patient alcoholic. Probable duration of illness, one year. Weight, highest, one hundred and forty-two pounds; on admission, one hundred and five pounds; before death, one hundred and three and one-half pounds. No edema. Bowels, regular. Slight arteriosclerosis. Sputum, not recorded. Urine, acid, 1020, trace of albumin, white blood-corpuscles, uric acid crystals. Heart, second pulmonic accentuated. Pulse, 120 to 170; respiration, 35 to 55; temperature, 96° to 104°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, chronic tuberculosis of the lungs with cavity formation, atheroma of aorta, fatty liver with miliary tubercles, tuberculous colitis, tuberculous appendicitis, diffuse nephritis. General appearance after death, emaciated. Heart, ten ounces, normal. Intestines, apparently normal, small ulcer at head of cæcum. Bladder, normal. Kidneys, left, two and one-half ounces, smaller than normal; right, three and one-half ounces; surface smooth, color and shape normal, section-surface glistening, moist, smooth, paler than normal, cortex slightly decreased, pyramids slightly smaller, consistency firm, capsule strips easily. Two kidneys cut into one hundred and forty sections.

Microscopic study: Eleven specimens in paraffin studied. Kidney investment normal. Malpighian bodies a little closer to investment than normally. Glomeruli congested, vacuolated, sometimes hyaline, especially in

certain areas where three and four are hyaline, one line space between glomerulus and capsule, which is usually empty, though sometimes filled with granular material. Bowman's capsule frequently thickened, though not usually. No proliferation of the epithelium of Bowman's capsule. Many fibroid glomeruli. Convoluted tubules usually somewhat dilated, lumen usually filled with granular debris and sometimes hyaline casts, epithelium swollen, granular, degenerated, and necrotic; near pyramids sometimes desquamated. Medullary rays the same. Cortex not congested. Interstitial tissue sometimes thickened near investment, but not elsewhere. Blood-vessels, intima slightly thickened. Two or three small focal interstitial areas under investment. Pyramids not congested, interstitial tissue slightly thickened; no casts. No tubercles. Diagnosis, chronic parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. 3633. Age, twenty-five. Male. White. Single. Irish-American. Entered hospital 9—7—'05; died 9—7—'05. Physician, Irwin. Clinical diagnosis, tuberculosis of the lungs, pneumothorax. Patient was too ill and confused to obtain a history. Pulse, A. M. 120, P. M. 140; respiration, A. M. 25, P. M. 40; temperature, A. M. 95.3°, P. M. 100°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, right pneumothorax with purulent effusion, acute miliary tuberculosis of left lung with edema, tuberculous laryngitis, mitral stenosis with dilatation of heart, atheroma of aorta, chronic peritonitis with acute purulent peritonitis; fatty liver with perihepatitis, tuberculous enteritis, parenchymatous nephritis with glomerular changes, congestion of the spleen with tubercles, tuberculous adenitis and tonsillitis. General appearance after death, moderately well nourished. Heart, three hundred and twenty-six grams, dilated, normal shape, small milk spot at base of left ventricle. Intestines contain areas of congestion and small ulcers; cæcum contains a few small ulcers. Bladder, normal. Seminal vesicles, normal. Kidneys, left, one hundred and seventy-one grams; right, one hundred and seventy-one grams; normal shape, capsule slightly adherent, surface slightly granular, reddish brown, consistency firm, section-surface dull, opaque, reddish, cortex normal, pyramids, moderate congestion, superficial vessels are congested, section-surface shows a few miliary tubercles. The two kidneys cut into one hundred and eighty pieces; seven tubercles in cortex; four in pyramids.

Microscopic study: Fifty-two specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, not vacuolated, two lines space between glomerulus and capsule, space empty. Bowman's capsule normal or very slightly thick-

ened. Convoluted tubules under investment somewhat dilated, lumen contains granular debris, epithelium granular, degenerated, necrotic; toward pyramids the same, except not dilated. Cortex not congested; no casts. Medullary rays same as convoluted tubules toward pyramids. Interstitial tissue in cortex normal. Blood-vessels normal. Several focal interstitial areas under investment and scattered throughout cortex. Pyramids congested; interstitial tissue normal; no hyaline casts. Typical tubercle with caseation and giant cells. Diagnosis, acute parenchymatous nephritis, slight chronic focal interstitial nephritis, tubercles.

Case No. 3679. Age, thirty-five. Male. White. Married. American. Entered hospital 11-11-'05; died 11-15-'05. Physician, Montgomery. Clinical diagnosis, tuberculosis of lungs with cavity formation at both apices. Occupation, hat-finisher. Family history, negative. Previous diseases, measles, chicken-pox. Patient alcoholic. Probable duration of illness, three years. Weight, highest, one hundred and forty-one pounds; before death, one hundred and twenty-two pounds. No edema. Bowels, regular. Sputum, tubercle bacilli positive. Urine, acid, 1026. Heart, second pulmonic and aortic accentuated. Pulse, 100 to 130; respiration, 20 to 35; temperature, 97° to 100°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy, chronic fibroid pleurisy, chronic tuberculosis of lungs with cavity formation, congestion of liver with miliary tubercles, tuberculous enteritis, chronic appendicitis, diffuse nephritis, movable kidney on right side, congestion of spleen, tuberculosis of suprarenal, tuberculous adenitis. General appearance after death, slightly emaciated. Heart, three hundred and fifty-seven grams, dilated. Intestines, jejunum moderate congestion in irregular areas, ileum contains areas of congestion with one or two small ulcers. Bladder, normal. Seminal vesicles, normal. Kidneys, left, two hundred and thirty-three grams; right, two hundred and thirty-three grams; lobulated, capsule strips with difficulty, surface generally smooth, yellowish pink, consistency firm, section-surface dull, reddish-yellow, cortex slightly increased, pyramids about normal, several semi-solid cysts and several 1 mm. yellowish tubercles, movable kidneys. Two kidneys cut into one hundred and eighty sections; many (twenty to thirty) small tubercles in cortex, one or two in pyramids.

Microscopic study: Twenty-seven specimens in paraffin studied. Kidney investment quite markedly thickened. Malpighian bodies closer to investment than normally. Glomeruli usually congested, not vacuolated, two to three lines space between glomerulus and capsule. Bowman's capsule thickened. Convoluted tubules near investment, lumen normal in size, epithelium

degenerated and necrotic; toward pyramids no lumen, epithelium swollen, cloudy, degenerated and sometimes necrotic. Cortex not congested; a few hyaline casts. Medullary rays same as convoluted tubules near pyramids. Interstitial tissue in cortex slightly thickened. Blood-vessels usually normal, rarely show endarteritis. Typical focal interstitial areas and areas of round-cell infiltration under investment and throughout cortex. Pyramids somewhat congested; interstitial tissue normal; no casts. Typical tubercles with caseation and giant cells in cortex and pyramids. Diagnosis, chronic parenchymatous nephritis, slight chronic focal interstitial nephritis, tubercles.

Case No. 3697. Age, thirty-seven. Female. White. Single. American. Entered hospital 12-26-'05; died 1-10-'06. Physician, Ravenel. Clinical diagnosis, tuberculosis of lungs, larynx, and intestines. Occupation, housework. Family history, negative. Previous diseases, not recorded. No alcoholism. Probable duration of illness, one year. Weight, highest, not recorded; before death, not recorded. No edema. Bowels, regular. Sputum, tubercle bacilli positive. Urine, acid, 1020, diazo positive. Heart, normal. Pulse, 80 to 100; respiration, 30 to 50; temperature, 96° to 102°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy, chronic fibroid peritonitis, chronic tuberculosis of the lungs with cavity formation, congestion of liver, tuberculous enteritis and appendicitis, diffuse nephritis with miliary tubercles, early amyloid spleen, tuberculous adenitis and tonsillitis. General appearance after death, not recorded. Heart, seven ounces, contracted. Intestines, large and small typical tuberculous ulcers in whole tract. Bladder, not recorded. Kidneys, left, three and one-half ounces; right, three and one-half ounces; normal shape, capsule strips with difficulty, surface granular, red brown, section-surface dull, opaque, red, cortex somewhat decreased, pyramids normal. Two kidneys cut into one hundred and eighty sections; three tubercles in cortex, one in pyramids; one small cyst on surface.

Microscopic study: Thirty-four specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli slightly vacuolated, slightly congested, usually one line space between glomerulus and capsule, sometimes two lines space, space empty. Bowman's capsule slightly thickened. A rare Malpighian body fibroid. Convoluted tubules, epithelium swollen, granular, degenerated, sometimes slightly fatty and necrotic, lumen about normal in size and usually contains granular débris, rarely desquamated necrotic epithelium. Cortex not congested; hyaline casts only in focal interstitial areas. Medullary rays same as convoluted tubules. Interstitial tissue in cortex thickened. Blood-vessels,

slight endarteritis. One typical focal interstitial area under investment. Pyramids slightly congested; interstitial tissue slightly increased; a rare hyaline cast. Typical tubercles with caseation and giant cells, three in cortex, one in pyramids. One tubercle in cortex quite markedly vacuolated. Diagnosis, chronic parenchymatous nephritis, slight chronic focal interstitial nephritis, tubercles.

Case No. 3749. Age, eighteen. Female. White. Single. Russian-English. Entered hospital 11-10-'05; died 1-13-'06. Physician, Craig. Clinical diagnosis, tuberculosis of lungs, right side pneumothorax. Occupation, cap maker. Family history, negative. Previous diseases, pneumonia, epilepsy, erysipelas. No alcoholism. Probable duration of illness, four years. Weight, highest, one hundred and thirty-five pounds; before death, one hundred and nine pounds. No edema. Bowels, loose. No expectoration. Urine, acid, 1016, trace of albumin, diazo positive, few fine granular and hyaline casts. Heart, second pulmonic slightly accentuated. Pulse, 110 to 150; respiration, 30 to 62; temperature, 96° to 102°.

Autopsy, White. Pathological diagnosis, fibrino-purulent pleurisy with purulent effusion and pneumothorax on right side, atheroma of aorta, fatty changes with congestion and miliary tubercles of kidneys, tuberculous appendicitis, congestion of spleen with miliary tubercles, tuberculous tonsillitis and adenitis. General appearance after death, emaciated. Heart, normal. Intestines, whole tract normal except ileocaecal region, which contained distinct hemorrhagic areas. Bladder, normal. Kidneys, left, four and one-half ounces; right, four ounces; normal shape, capsule strips easily, smooth surface, red, consistency normal, section-surface dull, red, cortex normal, tubules pale, vessels congested, pyramids normal. Two kidneys cut into one hundred and ten sections; four tubercles in cortex; no cysts.

Microscopic study: Eighteen specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, rarely slightly vacuolated, usually no space between glomerulus and capsule, sometimes one line space. Bowman's capsule thickened. A rare Malpighian body hyaline. Convoluted tubules, lumen about normal size, epithelium somewhat swollen, degenerated, but rarely necrotic. Cortex not congested; a rare hyaline cast. Medullary rays same as convoluted tubules except lumen usually filled with granular débris. Interstitial tissue in cortex thickened. Blood-vessels normal. One or two small focal interstitial areas under investment and throughout cortex. Pyramids congested; interstitial tissue normal; no casts. Typical tubercles with caseation and giant cells in cortex. The thickening of the interstitial tissue in the

cortex generally, though evident, is scarcely sufficient to allow of a diagnosis of interstitial nephritis, though it may possibly be a beginning general interstitial nephritis. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis, tubercles.

Case No. 3896. Age, twenty-seven. Male. Black. Single. American. Entered hospital 2-1-'06; died 2-10-'06. Physician, Walsh. Clinical diagnosis, tuberculosis of lungs with cavity formation on right. Occupation, laborer. Family history, negative. Previous disease, syphilis. Patient alcoholic. Probable duration of illness, one year. Weight, highest, one hundred and sixty pounds; before death, one hundred and twenty and one-half pounds. No edema. Bowels, regular. Sputum, tubercle bacilli negative. Urine, acid, 1022, albumin present, a few hyaline casts with white blood-corpuscles attached. Heart, normal. Pulse, 78 to 140; respiration, 20 to 60; temperature, 97° to 102°.

Autopsy, White. Pathological diagnosis, chronic fibroid pleurisy, chronic tuberculosis of the lungs with cavity formation, dilatation of heart without ventricular hypertrophy, passive congestion of liver with miliary tubercles, diffuse nephritis, congestion of spleen, tuberculous adenitis, tuberculous appendicitis. General appearance after death, emaciated. Heart, eighteen ounces, greatly dilated, ventricles dilated and filled with currant-jelly clots. Intestines, congested in areas but free from ulceration. Bladder, normal. Seminal vesicles, normal. Kidneys, left, seven ounces; right, seven ounces; normal shape, capsule strips easily, smooth surface, pale, consistency soft, section-surface dull, opaque, cortex slightly increased but narrow for size of organ, pyramids normal. Two kidneys cut into one hundred and fifty sections; one suspicious and one quite positive tubercle found.

Microscopic study: Number of specimens not recorded. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli sometimes congested and sometimes vacuolated, one to two lines space between glomerulus and capsule. Bowman's capsule normal except in focal interstitial areas and areas of round-cell infiltration, where it is thickened. Convoluted tubules near investment, lumen filled with desquamated necrotic epithelium; toward pyramids the same condition is common, though in general the lumen is larger and there is less desquamation, the epithelium is granular everywhere, with sometimes evidence of fatty degeneration. Medullary rays, epithelium usually granular, rarely fatty, and sometimes desquamated and necrotic; numerous hyaline casts in the outer half, none in the inner half of cortex. Interstitial tissue in cortex is thickened everywhere in the outer half, but then this part shows almost continuous focal interstitial areas; in

the inner half the interstitial tissue is normal. Blood-vessels normal. Pyramids slightly congested; interstitial tissue slightly increased; no casts. Typical focal interstitial areas under investment, some of them made up of fibrous tissue, though more commonly cellular in character. These contain several tubules, cystic, dilated, filled with granular material; other tubules, especially at the edge of these areas, show the epithelium swollen and granular and the lumen filled with desquamated necrotic and sometimes fatty epithelium. These areas usually show congestion, several fibroid and hyaline glomeruli, many hyaline casts. Several focal interstitial areas in middle of cortex in which fibrous tissue takes on some of the appearance of cartilage. Several of the straight tubules in focal interstitial areas contain hyaline casts. No tubercles. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis.

Case No. 3949. Age, thirty-eight. Male. White. Married. Irish. Entered hospital 3—3—'06; died 4—4—'06. Physician, Hatfield. Clinical diagnosis, tuberculosis of larynx, lungs, ribs, and intestines. Occupation, teamster. Family history, father died of pneumonia, one sister died of confinement. Previous diseases, rheumatism, measles, pertussis. Father and patient alcoholic. Probable duration of illness, two years. Weight, highest one hundred and forty-eight pounds; on admission, ninety-nine pounds; before death, ninety-seven and one-half pounds. No edema. Bowels, regular. Moderate arteriosclerosis. Sputum, tubercle bacilli positive. Urine, acid, 1024, albumin present, diazo positive, no casts. Heart, second pulmonic and aortic accentuated. Pulse, 100 to 120; respiration, 24 to 40; temperature, 97° to 102°.

Autopsy, White. Pathological diagnosis, chronic obliterative pleurisy (both sides), chronic tuberculosis of lungs with cavities and bronchopneumonia, tuberculosis of intestines (ulceration), diffuse nephritis with tubercles. General appearance after death, emaciated. Heart, seven ounces, normal. Intestines, numerous small superficial ulcers, not typical of tuberculosis. Bladder, normal. Seminal vesicles, normal. Kidneys, left, seven ounces; right, seven ounces; normal shape, consistency firm, capsule adherent, surface granular, section-surface dull, cortex slightly decreased or normal. The two kidneys were cut into one hundred and seventy sections; several small cysts found.

Microscopic study: Twenty specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, not vacuolated, one line or no space between glomerulus and capsule. Bowman's capsule normal, rarely thickened. Convoluted

tubules under investment, lumen normal in size, usually empty, epithelium degenerated, occasionally showing slight fatty degeneration; elsewhere usually no lumen visible, but when present it is filled with granular debris, epithelium swollen, granular, degenerated and sometimes necrotic. Cortex congested; no casts. Medullary rays same as latter convoluted tubules. Interstitial tissue in cortex normal. Blood-vessels normal. One small focal interstitial area under investment. No areas of round-cell infiltration. Pyramids congested; interstitial tissue normal. One small old infarct. Diagnosis, mild grade acute parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. A-464. Philadelphia Hospital. Age, twenty-nine. Male. Black. American. Entered hospital 5-29-'05; died 6-6-'05. Physician, Landis. Clinical diagnosis, tuberculosis of lungs, pneumothorax, obliterative pleuritis (left side). Occupation, laborer. Family history, father died of heart disease. Previous diseases, mumps, measles, chicken-pox, whooping-cough, diphtheria, rheumatism, tonsillitis, grip, pleurisy, gonorrhea, syphilis, tendency to sore throat. No alcoholism. Probable duration of illness, one year and a half. Weight, not recorded. Edema of ankles. Bowels, loose. Sputum, tubercle bacilli positive. Urine, 5-30-'05, acid, 1015, no sugar or albumin. Heart, second pulmonic accentuated. Pulse, 80 to 110; respiration, 35 to 45; temperature, 98.5° to 101.6°.

Pathological diagnosis, tuberculosis of the lungs, liver, spleen, intestines, and lymph-glands. General appearance after death, emaciated. Heart, three hundred and fifty grams, slight sclerosis of mitral valve. Intestines, normal. Bladder, not recorded. Seminal vesicles, not recorded. Kidneys, left, one hundred and eighty grams; right, one hundred and seventy grams; about normal size, capsule strips with difficulty, leaves smooth congested surface with prominent stellate veins, cortex narrowed, double ureters. Two kidneys cut into one hundred and thirty sections; three suspicious tubercles; four cysts.

Microscopic study: Sixteen specimens in paraffin studied. Kidney investment normal or thickened. Malpighian bodies a little closer to investment than normally. Glomeruli congested, not vacuolated, one to two lines space between glomerulus and capsule. Bowman's capsule normal or slightly thickened; in focal interstitial areas proliferation of the epithelium of Bowman's. Convoluted tubules generally dilated, epithelium somewhat atrophic and granular. Medullary rays not recorded. Cortex congested; hyaline casts especially in focal interstitial areas. Interstitial tissue in cortex thickened. Blood-vessels show endarteritis. Several focal interstitial areas and several areas of round-cell infiltration under investment. Pyramids con-

gested; interstitial tissue slightly increased. One area 1 mm. in diameter in pyramid a hyaline degenerated mass. Two of the suspicious tubercles were hyaline masses, one a large focal interstitial area. No tubercles. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis.

Case No. A-1102. Philadelphia Hospital. Age, forty-nine. Male. White. Widower. American. Entered hospital 12-30-'05; died 1-31-'06. Clinical diagnosis, phthisis pulmonalis. Occupation, laborer. Family history, negative. Previous diseases, measles, chicken-pox, whooping-cough, pleurisy. Patient alcoholic. Probable duration of illness, six months. Weight, highest, one hundred and forty pounds; before death, not recorded. No edema. Bowels, loose. Sputum, tubercle bacilli positive. Urine, 1-2-'06, acid, 1012, a trace of albumin, leucocytes present, few epithelial cells, diazo negative. Heart, second pulmonic accentuated. Pulse, 100 to 110; respiration, 30 to 35; temperature, 98° to 100°.

Pathological diagnosis, tuberculosis of lungs, tuberculous enteritis, endocarditis, slight arteriosclerosis. General appearance after death, emaciated. Heart, three hundred grams, sclerosis of tricuspid, mitral, and aortic valves and of aorta. Intestines, number of tuberculous ulcers found in lower part of ileum. Bladder, not recorded. Seminal vesicles, not recorded. Kidneys, left, one hundred and sixty grams; right, one hundred and fifty grams; normal in size, capsule strips easily, leaving a smooth, glistening surface. One kidney cut into ninety sections.

Microscopic study: Ten specimens in paraffin studied. Kidney investment thinner. Malpighian bodies normally distant from investment. Glomeruli usually normal in size, not congested, slightly vacuolated, and show a little more fibrous tissue than normally; many fibroid, two lines space between glomerulus and capsule. Bowman's capsule usually thickened. Everywhere convoluted tubules dilated, epithelium atrophic; toward pyramids epithelium sometimes disintegrated and in this region rarely necrotic. Medullary rays the same. Considerable congestion under investment, which lessens toward pyramids. A few hyaline casts. Everywhere interstitial tissue in cortex decidedly thickened; many large (1 mm.) areas of round-cell infiltration. Blood-vessels normal. Pyramids not congested; interstitial tissue increased; a few hyaline casts, occasional granular casts, a few red blood-corpuscle casts. No tubercles. Diagnosis, chronic general interstitial nephritis.

Private case. Age, forty-one. Male. White. Married. American. Started treatment 1-11-'04; died 6-28-'06. Physician, Stanton. Clinical diagnosis, tuberculosis of lungs, double hernia. Occupation, worked in

furniture factory up till five years ago, mail carrier since. Family history, mother died of cough following grip, aged sixty-six; one brother died, probably of phthisis; father died of apoplexy. Previous diseases, pneumonia, pleurisy. Patient alcoholic, but not for the past four years. Probable duration of illness, six years. Weight, highest, one hundred and sixty-seven pounds; before death, one hundred and twenty-seven and one-half pounds. Edema present. Bowels, 1-11-'04, loose; 12-13-'04, diarrhea persistent. Sputum, tubercle bacilli positive. Urine, very small amount of albumin, no sugar, numerous casts of all kinds, some pus cells. Heart, normal. Pulse, 80 to 96; respiration, normal; temperature, normal.

Autopsy, Stanton. Pathological diagnosis, tuberculosis of lungs with bilateral cavity formation, cardiac hypertrophy, chronic pericarditis, amyloid liver and spleen. General appearance after death, emaciated. Heart, hypertrophied. Intestines, normal. Bladder, normal. Seminal vesicles, normal. Kidneys, small for size of patient, five or six tubercles, one small cyst in pyramid. Two kidneys cut into one hundred and sixty sections.

Microscopic study: Twenty-one specimens in paraffin studied. Kidney investment normal or slightly thickened. Malpighian bodies sometimes closer to investment than normally. Glomeruli congested, not vacuolated, two lines space between glomerulus and capsule, space empty. Bowman's capsule thickened. Several Malpighian bodies fibroid. Convoluted tubules under investment somewhat dilated, lumen filled with desquamated epithelium and debris, epithelium somewhat degenerated, atrophic and necrotic; toward pyramids lumen about normal in size, sometimes smaller, epithelium swollen, degenerated, and quite markedly necrotic. Medullary rays same as latter. Cortex congested; a few hyaline casts. Interstitial tissue in cortex considerably thickened. Blood-vessels normal. Small focal interstitial areas and areas of round-cell infiltration under investment and throughout cortex. Pyramids congested; interstitial tissue increased; no casts. Typical tubercles with caseation and giant cells in cortex. Diagnosis, chronic general interstitial nephritis, slight chronic focal interstitial nephritis, tubercles.

FURTHER DETAILS OF TUBERCULOUS CASES REPORTED LAST YEAR.

Case No. 53. Single. Irish-American. Family history, father died of paralysis. Patient alcoholic. Autopsy: General appearance after death, emaciated. Bladder, normal. Seminal vesicles, not recorded. Microscopic study of kidneys: Blood-vessels normal. Interstitial tissue in pyramids normal. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis.

Case No. 232. Married. Canadian. Family history, mother, father, and wife's mother died of tuberculosis. Father alcoholic. Autopsy: General appearance after death, well nourished. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels normal. Interstitial tissue in pyramids normal. Diagnosis, chronic parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. 236. Single. United States. Family history, father died of pneumonia, mother of tuberculosis. Father alcoholic. Autopsy: General appearance after death, emaciated. Bladder, ulcerated. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels thickened, possibly due to beginning amyloid. Interstitial tissue in pyramids slightly increased. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis and beginning amyloid degeneration (though it does not respond to gentian-violet) of right kidney; ulcerative tuberculosis of left kidney.

Case No. 282. Married. Irish. Family history, wife has tuberculosis, one child, eight years old, died of tuberculosis of the lungs. Father alcoholic. Autopsy: General appearance after death, emaciation not marked. Bladder, normal. Seminal vesicles, not examined. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids normal. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis, possible tubercles.

Case No. 501. Widower. Irish. Family history, negative. Patient and father alcoholic. Autopsy: General appearance after death, emaciated. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, marked thickening of media. Interstitial tissue in pyramids markedly increased. Diagnosis, chronic general interstitial nephritis, slight chronic focal interstitial nephritis.

Case No. 551. Single. German. Family history, negative. No alcoholism. Autopsy: General appearance after death, extremely well nourished. Bladder, normal. Microscopic study of kidneys: Blood-vessels slightly thickened. Interstitial tissue in pyramids normal. Diagnosis, acute parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. 714. Single. American. Family history, negative. No alcoholism. Autopsy: General appearance after death, marked emaciation. Bladder, not recorded. Seminal vesicles, not recorded. Microscopic study of kidneys: Blood-vessels, usually normal. Interstitial tissue in pyramids,

increased. Diagnosis, cloudy swelling, chronic focal interstitial nephritis, beginning amyloid degeneration, scattered tubercles, tubercle bacilli in various parts of the kidneys.

Case No. 945. Married. Hungarian. Family history, mother and father died of tuberculosis. No alcoholism. Autopsy: General appearance after death, emaciated. Bladder, normal. Microscopic study of kidneys: Blood-vessels, sometimes slightly thickened; usually normal. Interstitial tissue in pyramids normal. Diagnosis, acute parenchymatous nephritis, chronic focal interstitial nephritis, tubercles.

Case No. 1032. Single. Irish-American. Family history, father and mother died of tuberculosis. No alcoholism. Autopsy: General appearance after death, marked emaciation. Bladder, not recorded. Seminal vesicles, not recorded. Microscopic study of kidneys: Blood-vessels, usually normal, sometimes thickened. Interstitial tissue in pyramids, normal. Diagnosis, chronic parenchymatous nephritis, beginning amyloid degeneration, slight chronic focal interstitial nephritis, tubercles.

Case No. 1297. Widower. German-American. Family history, one sister died of tuberculosis. No alcoholism. Autopsy: General appearance after death, marked emaciation. Bladder, normal. Seminal vesicles, not recorded. Microscopic study of kidneys: Blood-vessels, intima usually thickened. Interstitial tissue in pyramids, increased. Diagnosis, cloudy swelling, chronic focal interstitial nephritis.

Case No. 1577. Widow. Black. American. Family history, husband died of tuberculosis. No alcoholism. Autopsy: General appearance after death, emaciated. Bladder, no ulcers. Microscopic study of kidneys: Blood-vessels, thickened, especially the intima. Interstitial tissue in pyramids, slightly increased. Diagnosis, mild grade of amyloid degeneration, mild grade chronic parenchymatous nephritis, tubercles.

Case No. 1896. Married. Black. American. Family history, not recorded. No alcoholism. Autopsy: General appearance after death, markedly emaciated. Bladder, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, slightly increased. Diagnosis, cloudy swelling.

Case No. 2046. Widower. United States. Family history, father died of kidney trouble, mother suddenly of unknown disease, one brother of pneumonia, one brother of influenza, wife of tuberculosis. Patient alcoholic.

Autopsy: General appearance after death, well nourished. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, frequently normal, but sometimes show proliferation of intima and sometimes complete obliteration. Interstitial tissue in pyramids, normal. Diagnosis, acute parenchymatous nephritis, chronic focal interstitial nephritis.

Case No. 2102. Single. Irish-American. Family history, negative. No alcoholism. Autopsy: General appearance after death, emaciated. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, usually normal, but sometimes intima proliferated. Interstitial tissue in pyramids, normal. Diagnosis, chronic parenchymatous nephritis, amyloid degeneration, chronic focal interstitial nephritis, tubercles.

Case No. 2180. Married. German. Family history, father died of typhoid, mother of tuberculosis. No alcoholism. Autopsy: General appearance after death, marked emaciation. Bladder, normal. Microscopic study of kidneys: Blood-vessels, slightly thickened. Interstitial tissue in pyramids, normal. Diagnosis, acute parenchymatous nephritis, slight chronic focal interstitial nephritis, tubercles.

Case No. 2213. Single. Russian. Family history, mother died of tuberculosis. No alcoholism. Autopsy: General appearance after death, fairly well nourished. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, slight endarteritis. Interstitial tissue in pyramids, normal. Diagnosis, cloudy swelling, chronic focal interstitial nephritis.

Case No. 2252. Single. German-American. Family history, father died of tuberculosis, mother insane. Father and patient alcoholic. Autopsy: General appearance after death, emaciated. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, cloudy swelling, chronic focal interstitial nephritis, tubercles.

Case No. 2262. Married. Irish. Family history, father died of dropsy, brother of phthisis. Father alcoholic. Autopsy: General appearance after death, marked emaciation. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels show proliferation of intima. Interstitial tissue in pyramids, not recorded. Diagnosis, cloudy swelling, chronic focal interstitial nephritis, tubercles.

Case No. 2289. Single. American. Family history, mother died of

phthisis. Father alcoholic. Autopsy: General appearance after death, marked emaciation. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, mild acute parenchymatous nephritis.

Case No. 2344. Married. Irish-American. Family history, negative. No alcoholism. Autopsy: General appearance after death, emaciated. Bladder, not recorded. Microscopic study of kidneys: Blood-vessels show a thickened intima and slight thickening of media. Interstitial tissue in pyramids, slightly increased. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis.

Case No. 2347. Married. American. Family history, father died of diabetes. Father and patient alcoholic. Autopsy: General appearance after death, well nourished. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis, tubercles.

Case No. 2356. Single. American. Family history, father and mother died of Bright's disease, one brother of consumption. Patient alcoholic. Autopsy: General appearance after death, extremely emaciated. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, slightly thickened. Interstitial tissue in pyramids, normal. Diagnosis acute parenchymatous nephritis, tubercles.

Case No. 2468. Married. American. Family history, father died of hepatic cirrhosis, mother of softening of brain, husband has tuberculosis, husband's mother died of tuberculosis. No alcoholism. Autopsy: General appearance after death, extremely emaciated. Bladder, normal. Microscopic study of kidneys: Blood-vessels, not recorded. Interstitial tissue in pyramids, normal. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis, tubercles.

Case No. 2477. Single. Irish-American. Family history, mother died of pneumonia. No alcoholism. Autopsy: General appearance after death, emaciated. Bladder, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis, tubercles.

Case No. 2490. Married. Irish-American. Family history, father died of tuberculosis, mother of apoplexy, two sisters of tuberculosis. Father

alcoholic. Autopsy: General appearance after death, not recorded. Bladder, normal. Seminal vesicles, not examined. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, mild acute parenchymatous nephritis, slight chronic focal interstitial nephritis, scattered cysts and tubercles.

Case No. 2494. Single. Irish. Family history, father died of heart disease. No alcoholism. Autopsy: General appearance after death, emaciated. Bladder presents several large irregular areas of ulceration. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, mild acute parenchymatous nephritis, scattered tubercles, ulcerative tuberculosis.

Case No. 2553. Single. American. Family history, mother died of typhoid. Patient alcoholic. Autopsy: General appearance after death, emaciated. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, usually normal, rarely thickened. Interstitial tissue in pyramids, normal. Diagnosis, mild chronic parenchymatous nephritis, chronic focal interstitial nephritis, tubercles.

Case No. 2564. Single. Irish. Family history, negative. Patient alcoholic. Autopsy: General appearance after death, extremely emaciated. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, thickened, some endarteritis. Pyramids congested. Interstitial tissue in pyramids, slightly increased. Diagnosis, acute exacerbation of mild chronic parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. 2576. Single. American. Family history, negative. No alcoholism. Autopsy: General appearance after death, extremely emaciated. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, mild acute parenchymatous nephritis, infarcts.

Case No. 2582. Single. American. Family history, mother probably has tuberculosis. No alcoholism. Autopsy: General appearance after death, emaciated. Bladder, not recorded. Seminal vesicles, not recorded. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, mild acute parenchymatous nephritis, one tubercle.

Case No. 2596. Married. German-American. Family history, father

died of tuberculosis. No alcoholism. Autopsy: General appearance after death, extremely emaciated. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, acute parenchymatous nephritis, slight chronic focal interstitial nephritis, tubercles.

Case No. 2602. Single. American. Family history, mother died of tuberculosis. No alcoholism. Autopsy: General appearance after death, markedly emaciated. Bladder, normal. Microscopic study of kidneys: Blood-vessels, not recorded. Interstitial tissue in pyramids, normal. Diagnosis, mild acute parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. 2657. Single. Italian-American. Family history, negative. No alcoholism. Autopsy: General appearance after death, not recorded. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, not recorded. Diagnosis, cloudy swelling, slight chronic focal interstitial nephritis.

Case No. 2662. Married. Irish-Canadian. Family history, father died of tuberculosis. Father and patient alcoholic. Autopsy: General appearance after death, well nourished. Bladder, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, slightly increased. Diagnosis, acute parenchymatous nephritis, chronic focal interstitial nephritis, tubercles.

Case No. 2664. Married. American. Family history, negative. Father and patient alcoholic. Autopsy: General appearance after death, marked emaciation. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, acute diffuse nephritis, chronic focal interstitial nephritis.

Case No. 2668. Married. Black. American. Family history, negative. No alcoholism. Autopsy: General appearance after death, marked emaciation. Bladder, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, cloudy swelling, miliary tuberculosis.

Case No. 2689. Single. American. Family history, mother died of apoplexy, one sister and one brother of tuberculosis. No alcoholism. Autopsy: General appearance after death, well nourished. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, nor-

mal. Interstitial tissue in pyramids, normal. Diagnosis, mild acute parenchymatous nephritis, chronic focal interstitial nephritis.

Case No. 2701. Single. Black. American. Family history, negative. No alcoholism. Autopsy: General appearance after death, emaciated. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, not recorded. Diagnosis, mild acute parenchymatous nephritis.

Case No. 2768. Single. Irish-American. Family history, father died of relapsing typhoid. Father and patient alcoholic. Autopsy: General appearance after death, marked emaciation. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, usually normal. Interstitial tissue in pyramids, normal. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis.

Case No. 2787. Married. American. Family history, mother died of tuberculosis, one brother of tuberculosis. No alcoholism. Autopsy: General appearance after death, marked emaciation. Bladder, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, mild acute parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. 2796. Single. American. Family history, negative. No alcoholism. Autopsy: General appearance after death, marked emaciation. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, mild acute parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. 2800. Single. American. Family history, father died of brain fever, one brother of typhoid. No alcoholism. Autopsy: General appearance after death, emaciated. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, generally thickened. Interstitial tissue in pyramids, increased. Diagnosis, chronic general interstitial nephritis, slight chronic focal interstitial nephritis, tubercles.

Case No. 2815. Married. Irish-American. Family history, mother died of tuberculosis, one sister of tuberculosis. No alcoholism. Autopsy: General appearance after death, slight emaciation. Bladder, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, increased. Diagnosis, acute parenchymatous nephritis, tubercles.

Case No. 2821. Single. Swede. Family history, negative. No alcoholism. Autopsy: General appearance after death, well nourished. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, usually normal. Interstitial tissue in pyramids, normal. Diagnosis, acute parenchymatous nephritis, hemorrhagic infarct, tubercles.

Case No. 2855. Married. American. Family history, mother died of pneumonia. Father and patient alcoholic. Autopsy: General appearance after death, emaciated. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels sometimes show slight endarteritis. Interstitial tissue in pyramids, increased. Diagnosis, chronic parenchymatous nephritis, widespread chronic focal interstitial nephritis, tubercles.

Case No. 2856. Widow. Irish. Family history, negative. No alcoholism. Autopsy: General appearance after death, much emaciated. Bladder, normal. Microscopic study of kidneys: Blood-vessels, show intima thickened. Interstitial tissue in pyramids, slightly increased. Diagnosis, acute parenchymatous nephritis, slight chronic focal interstitial nephritis, tubercles.

Case No. 2899. Married. Polish. Family history, unrecorded. No alcoholism. Autopsy: General appearance after death, marked emaciation. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, mild chronic parenchymatous nephritis, slight chronic focal interstitial nephritis, tubercles.

Case No. 2926. Single. Italian-American. Family history, negative. No alcoholism. Autopsy: General appearance after death, emaciated. Bladder, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, acute parenchymatous nephritis, hemorrhagic infarct.

Case No. 2977. Single. White. Irish. Family history, negative. No alcoholism. Autopsy: General appearance after death, emaciated. Bladder, normal. Microscopic study of kidneys: Blood-vessels, show slight endarteritis. Interstitial tissue in pyramids, increased. Diagnosis, acute parenchymatous nephritis, chronic focal interstitial nephritis.

Case No. 2989. Single. White. American. Family history, negative. No alcoholism. Autopsy: General appearance after death, emaciated.

Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, generally slightly thickened. Interstitial tissue in pyramids, slightly increased. Diagnosis, cloudy swelling, chronic focal interstitial nephritis.

Case No. 3010. Single. White. Irish. Family history, negative. Patient alcoholic. Autopsy: General appearance after death, emaciated. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, acute parenchymatous nephritis.

Case No. 3054. Single. American. Family history, father and mother died of consumption. No alcoholism. Autopsy: General appearance after death, slightly emaciated. Bladder, normal. Seminal vesicles, normal. Microscopic study of kidneys: Blood-vessels, normal. Interstitial tissue in pyramids, normal. Diagnosis, mild chronic parenchymatous nephritis, slight chronic focal interstitial nephritis, tubercles.

Case No. 3388. Married. White. American. Family history, brother died of tuberculosis. No alcoholism. Autopsy: General appearance after death, marked emaciation. Bladder, not recorded. Seminal vesicles, not recorded. Microscopic study of kidneys: Blood-vessels, slightly thickened. Interstitial tissue in pyramids, slightly increased. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis.

Private Case. Single. American. Family history, negative. No alcoholism. Autopsy: General appearance after death, very well nourished. Bladder, normal. Microscopic study of kidneys: Blood-vessels, thickened. Interstitial tissue in pyramids, slightly increased. Diagnosis, acute diffuse nephritis, chronic focal interstitial nephritis, tubercles.

NON-TUBERCULOUS CASES.

Case No. 3329. Phipps Institute. Age, forty-six. Male. White. Married. Hungarian. Entered hospital 5-12-'05; died 5-20-'05. Occupation, tanner. Family history, not recorded. Previous diseases, influenza, measles. Patient alcoholic. No edema. Bowels, constipated. Urine, acid, 1028. Pulse, 80 to 120; respiration, 20 to 35; temperature, 96° to 99°.

Pathological diagnosis, aneurism of the arch of the aorta, cylindrical dilatation of the ascending aorta, dilated left heart, double-sided hydrothorax, passive congestion of liver, spleen and kidneys. General appearance after death, moderately emaciated. Heart, cavities all enlarged without enlarge-

ment of the walls. Kidneys, left, two hundred and two grams; right, two hundred and two grams; slightly lobulated, capsule slightly adherent, surface somewhat granular, color generally pink, consistency slightly firm, cortex slightly decreased, pyramids normal. One kidney cut into seventy sections; a few small cysts (ten or twelve), one cyst size of bean filled with gelatinous material and five small stones; one yellowish speck in pyramid looking like tubercle.

Microscopic study: Eighteen specimens in paraffin studied. Kidney investment normal. Malpighian bodies closer to investment than normally. Glomeruli congested, sometimes vacuolated, one to two lines space between glomerulus and capsule, space usually empty, sometimes contains a few red blood-corpuscles, again some desquamated epithelium. Bowman's capsule normal or slightly thickened, sometimes slight proliferation of epithelium. Rarely Malpighian body hyaline fibroid. Convoluted tubules, usually no lumen; when lumen exists it is filled with granular debris or desquamated necrotic epithelium; epithelium swollen, degenerated, fatty, necrotic. Medullary rays same as convoluted tubules, but show no desquamation. Cortex congested; hyaline casts. Interstitial tissue in cortex usually slightly thickened, though in focal interstitial areas quite evidently so, and it is especially in these latter that the hyaline casts appear. Blood-vessels usually normal, sometimes proliferation of intima. Two focal interstitial areas under investment. Pyramids congested; interstitial tissue markedly increased; hyaline casts. The yellowish speck is a thickened blood-vessel, showing thickened intima and adventitia. Several microscopic cysts. Several cystic tubules under investment. Diagnosis, slight chronic general interstitial nephritis, slight chronic focal interstitial nephritis.

Case No. 3537. Phipps Institute. Age, sixty-seven. Female. White. Widow. German. Entered hospital 7-21-'05; died 11-17-'05. Occupation, housework. Family history, negative. Previous diseases, pleurisy, pneumonia three times, influenza. No alcoholism. No edema. Bowels, constipated. Urine, 7-22-'05, acid, 1020, albumin present, no sugar, diazo reaction present. Pulse, 100 to 110; respiration, 30 to 40; temperature, 97° to 101°.

Pathological diagnosis, chronic fibroid pleurisy, bronchopneumonia, dilatation with hypertrophy of heart, atheroma of aorta, fibrocystic goitre of the right side, cirrhosis of liver, congestion of intestines, congestion of lymphatic glands, diffuse nephritis with cyst formation, congestion of spleen, retroversion of uterus, sclerotic ovaries. General appearance after death, emaciated. Heart, three hundred and eighty-eight grams, dilated. Kidneys,

left, two hundred and two grams; right, two hundred and two grams; shape generally normal, capsule adherent, surface granular, section-surface dull, opaque, reddish yellow, cortex diminished, kidneys somewhat large for size of individual, consistency firm, numerous cysts. Two kidneys cut into one hundred and sixty sections.

Microscopic study: Twenty-three specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, not vacuolated, two lines space between glomerulus and capsule, space usually empty, rarely one or two desquamated and necrotic epithelial cells. Bowman's capsule normal except in focal interstitial areas, where it is thickened. Malpighian bodies in focal interstitial areas are sometimes fibroid. Convoluted tubules toward investment, lumen normal in size and frequently contains desquamated, necrotic epithelium; toward pyramids lumen more or less obliterated by swelling of the epithelium, epithelium generally swollen, granular, degenerated, and sometimes necrotic. Medullary rays like convoluted tubules toward pyramids. Cortex congested; a few hyaline casts. Interstitial tissue in cortex thickened. Blood-vessels usually normal, occasionally slight endarteritis. Typical focal interstitial areas and areas of round-cell infiltration under investment and scattered throughout cortex. Pyramids congested; interstitial tissue markedly increased; many hyaline casts and many plugs of hyaline granular debris and necrotic epithelium filling the tubules, especially near papillæ. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis.

Case No. 3699. Phipps Institute. Age, fourteen. Male. White. Single. American. Entered hospital 10-14-'05; died 1-13-'06. Occupation, school-boy. Family history, negative. Previous diseases, chronic rheumatism, pertussis, chicken-pox. No alcoholism. Edema present. Bowels, regular. Urine, 11-15-'05, trace of albumin. Pulse, 100 to 140; respiration, 25 to 50; temperature, 97° to 103°.

Pathological diagnosis, chronic obliterative pleurisy, hypostatic pneumonia right side, chronic dilatation of heart, mitral and aortic valvulitis, passive congestion of liver, diffuse nephritis, infarcts of kidneys, passive congestion of spleen, edema of larynx, hypertrophy and vacuolization of heart fibers. General appearance after death, not emaciated. Heart, dilated, ventricles of both sides greatly dilated with only moderate thickening of muscle. Kidneys, left, four and one-half ounces; right, four ounces; normal shape, capsule strips easily, smooth, pale, consistency normal, section-surface dull, opaque, cortex normal thickness, pyramids congested, organs generally normal except for several small red infarcts; these were moderately old. Two kidneys cut into

one hundred and fifty sections; three or four quite large scars on surface apparently old infarcts; some of these extend to pyramids.

Microscopic study: Fourteen specimens in paraffin studied. Kidney investment normal. Malpighian bodies possibly slightly closer to investment than normally. Glomeruli occasionally slightly congested, not vacuolated, in focal interstitial areas fibroid, usually no space between glomerulus and capsule, sometimes one line space. Bowman's capsule usually normal, sometimes the connective tissue is markedly thickened and sometimes the epithelium is proliferated. The thickening is sometimes so great as to make Malpighian bodies look fibroid; it is found especially in focal interstitial areas, but also elsewhere in cortex. Convoluted tubules, epithelium swollen, degenerated, necrotic, lumen almost obliterated, and when present filled with granular debris and sometimes necrotic epithelium. Medullary rays the same. Cortex not congested; hyaline casts especially in focal interstitial areas. Interstitial tissue in cortex normal except in focal interstitial areas and infarcts. Blood-vessels normal. Many typical focal interstitial areas under investment and scattered throughout cortex. The typical focal interstitial areas have no connection with the infarcts and are scattered throughout cortex even apart from the investment. Pyramids slightly congested; interstitial tissue normal; occasional hyaline casts. The macroscopic scars are infarcts. Diagnosis, acute parenchymatous nephritis, chronic focal interstitial nephritis, infarcts.

Case No. A-1. Philadelphia Hospital. Age, thirty days. Female. White. Single. American. Entered hospital 11-16-'05; died 12-8-'05. No family history. No previous diseases. No alcoholism in parents. No edema. Bowels, regular. No examination of urine. Respiration, 35 to 40; temperature, 98°.

Pathological diagnosis, ileocolitis. General appearance after death, not recorded. Heart, twenty-five grams, musculature of heart is pale but firm in consistency, valve leaflets are normal, the ductus arteriosus is patulous. Kidneys, left, twenty-five grams; right, twenty-five grams; left shows fetal lobulation. The two kidneys cut into forty sections.

Microscopic study: Four specimens in paraffin were studied. Kidney investment normal. Malpighian bodies close to investment and very numerous, many touching investment. Glomeruli normal size, congested, not vacuolated, one to two lines space between glomerulus and capsule. Bowman's capsule normal, but stands out more clearly than in adult. Convoluted tubules, epithelium swollen, slightly cloudy, not necrotic. Cortex not congested. Medullary rays reach investment. Interstitial tissue in cortex usually normal. Blood-vessels normal. Two blood-vessels filled with white blood-corpuscles.

Five hyaline casts, all in one (0.5 mm.) area in which the interstitial tissue is thickened. Pyramids not congested; interstitial tissue normal. Diagnosis, slight cloudy swelling.

Case No. A-2. Philadelphia Hospital. Age, one month. Male. White. Single. American. Entered hospital 11-12-'05; died 12-13-'05. Family history, negative. No previous diseases. No alcoholism in parents. No edema. Bowels, regular. Pulse, 120 to 130; respiration, 25 to 30; temperature, 98° to 99°.

Pathological diagnosis, general anæmia, catarrhal enteritis. General appearance after death, emaciated. Heart, normal in size, apex formed by both ventricles, muscle of left ventricle 1 cm. at thickest point, pale, firm in consistency, right ventricle measures 5 cm. at thickest point, pale, but normal consistency. Macroscopic appearance of intestines normal. Kidneys, normal. Two kidneys cut.

Microscopic study: Four specimens in paraffin studied. Kidney investment normal. Glomeruli filled with nuclei (more than in adult), sometimes contain two or three vacuoles, but generally not vacuolated, some slightly congested, one to two lines space between glomerulus and capsule. The nuclei in glomerulus so numerous that sometimes space seems to be filled with them. Bowman's capsule distinct, almost thickened. Convoluted tubules not dilated, some show a lumen, some do not, epithelium slightly swollen with edges slightly disintegrated, especially in some tubules; sometimes edges of epithelium broken and lumen filled with débris, though this is uncommon. Medullary rays much more in evidence than in the adult and nearer the investment, sometimes they almost touch the investment. Cortex not congested. Three distinct hyaline and two débris casts found in cortex. Interstitial tissue in cortex evident, but not thickened. Blood-vessels normal. No appearance of focal interstitial areas or areas of round-cell infiltration. Sometimes between tubules a small accumulation of round cells. Pyramids generally congested; interstitial tissue normal. Frequently convoluted tubules found with lumen filled with pink round balls looking like the epithelium in the alveoli in catarrhal pneumonia, except they contain no nuclei. The epithelium lining the wall of the tubules appears flattened but otherwise healthy. Sometimes these balls are broken up and have run together, making a mass of débris. Diagnosis, cloudy swelling.

Case No. A-3. Philadelphia Hospital. Age, fifty-five. Male. White. Married. Frenchman. Entered hospital 4-4-'06; died 5-2-'06. Occupation, weaver. Family history, negative. No previous diseases. Patient

alcoholic. No edema. Bowels, constipated. Urine, acid, 1020, no albumin, no casts. Pulse, 80; respiration, 20; temperature, normal.

Pathological diagnosis, fatty degeneration of heart, congestion and edema of lungs, chronic parenchymatous nephritis, fatty infiltration of liver, slight acute gastritis. General appearance after death, emaciated. Heart, two hundred and forty grams, small, flabby, muscle pale in color. Kidneys, left, one hundred and thirty grams; right, one hundred and thirty grams; small, soft and flabby, capsule strips easily, surface smooth, rather pale, cortex normal. Two kidneys cut into one hundred and thirty sections; small cysts.

Microscopic study: Twenty specimens in paraffin studied. Kidney investment thickened. Malpighian bodies normally distant from investment. Glomeruli congested, slightly vacuolated, a few fibroid. Bowman's capsule thickened. Convoluted tubules, lumen about normal in size or slightly dilated, containing a small amount of granular debris and sometimes a few desquamated epithelial cells, epithelium usually somewhat swollen, degenerated, disintegrated, and sometimes necrotic. Medullary rays, lumen normal, epithelium slightly swollen and degenerated, rarely necrotic. Cortex congested; occasional hyaline casts. Interstitial tissue in cortex slightly thickened. Blood-vessels usually slightly thickened, sometimes evidently thickened. No focal interstitial areas or areas of round-cell infiltration under investment or throughout cortex. Pyramids congested; interstitial tissue increased. Diagnosis, chronic parenchymatous nephritis.

Case No. A-4. Age, sixty-seven. Male. Color, not recorded. Entered hospital 12-15-'05; died 2-19-'06. General facts in history, not recorded. Bowels, constipated. Urine, alkaline, 1009, epithelial cells. Pulse, 80 to 90; respiration, 25; temperature, 97° to 98°.

Pathological diagnosis, brown atrophy of heart, emphysema and edema of lungs, fibrosis of spleen, fatty and cystic degeneration of kidneys, cystitis, chronic hypertrophy of prostate, double hydrocele, fatty cirrhosis of liver, cholelithiasis. General appearance after death, well nourished. Heart, three hundred and forty grams, small, vessels on surface twisted, muscle firm and brown in color, aortic valve slight sclerosis, other valves normal. Kidneys, left, one hundred and eighty grams; right, one hundred and fifty grams; rather small, capsule strips easily, surface smooth on section, a large cyst near one pole. Two kidneys cut into one hundred and sixty sections.

Microscopic study: Fourteen specimens in paraffin studied. Kidney investment thickened. Malpighian bodies somewhat closer to investment than normally. Quite a few glomeruli in outer layer hyaline (not fibroid). Glomeruli congested, vacuolated, two to three lines space between glomerulus

and capsule. Bowman's capsule thickened. Convoluted tubules under investment far apart on account of the thickening of the interstitial tissue, epithelium somewhat shriveled; close to the pyramids there is not as much interstitial tissue; the convoluted tubules are dilated, epithelium degenerated, necrotic, and frequently disintegrated; in bunches the convoluted tubules are cystic dilated. Medullary rays dilated, epithelium atrophic. Cortex generally somewhat congested; numerous hyaline casts. Marked thickening of interstitial tissue under investment extending half-way through cortex. Blood-vessels show intense endarteritis. Cyst in cortex with all about it and for quite a distance away from it almost innumerable hyaline Malpighian bodies. Microscopic nodule of carcinoma 0.5 mm. in diameter surrounded like the cyst by hyaline Malpighian bodies and casts. It apparently has a wall; a second still smaller nodule is found in other specimens. Diagnosis, chronic general interstitial nephritis, carcinoma.

Case No. A-5. Philadelphia Hospital. Age, forty-eight. Male. White. Married. American. Entered hospital 5-25-'04; died 2-15-'06. Occupation, teamster. Family history, not recorded. Previous diseases, not recorded. Alcoholism, not recorded. Edema, not recorded. Bowels, regular. Urine, acid, 1028, no sugar, no albumin, few granular casts, leucocytes. Pulse, respiration, and temperature normal.

Pathological diagnosis, double pyelonephritis, fatty infiltration of heart, cystitis, bronchitis, marked fatty infiltration of omentum and mesentery. General appearance after death, not recorded. Heart, three hundred and eighty grams, right side dilated, walls thin, showing some fatty degeneration. Kidneys, left, one hundred and sixty grams; right, one hundred and sixty grams; normal in size, soft in consistency, capsule strips fairly easily, leaving a smooth surface, on section kidney is of a grayish color and shows a pyelitis, cortex markedly narrowed. Two kidneys cut into one hundred and fifty sections; many small, hard, gristle-like specks.

Microscopic study: Twelve specimens in paraffin studied. Kidney investment thickened. Malpighian bodies closer to investment than normally. Glomeruli congested, not vacuolated, two lines space between glomerulus and capsule. Bowman's capsule thickened. Convoluted tubules dilated, epithelium usually loosened from wall; epithelium about normal size, sometimes slightly flattened near investment, sometimes slightly swollen and degenerated, sometimes necrotic. Medullary rays the same. Cortex not congested; a rare hyaline cast. Interstitial tissue in cortex thickened. Blood-vessels show some endarteritis. Two focal interstitial areas, long and narrow, showing three or four hyaline Malpighian bodies. Pyramids not congested; inter-

stitial tissue markedly increased; a few hyaline casts. Several specimens filled with round cells looking like lymphocytes. In these specimens convoluted tubules scarcely discoverable, one here and there surrounded, covered and filled with round cells. Same condition in pyramids. The oil-immersion lens shows in the pyramids many polymorphonuclear cells, in cortex only lymphocytes. Diagnosis, chronic general interstitial nephritis, slight chronic focal interstitial nephritis, pyæmic abscesses.

Case No. A-1500. Philadelphia Hospital. Age, forty-five. Male. White. Ireland. Entered hospital 6-8-'05; died 8-23-'05. Occupation, sailor. Family history, negative. Previous diseases, measles, mumps, chicken-pox, whooping-cough, tripper, lues. Patient alcoholic. No edema. Bowels, constipated. Urine, 6-20-'05, acid, 1015, no sugar or albumin, epithelial cells, diazo slight; 7-6-'05, acid, 1020, very faint trace of albumin, leucocytes, hyaline casts, and epithelial cells; 8-17-'05, acid, 1017, no sugar or albumin, epithelial cells, leucocytes. Pulse, 80 to 100; respiration, 25 to 35; temperature, 98° to 101°.

Pathological diagnosis, aneurism of ascending portion of arch of aorta, chronic interstitial nephritis, chronic endocarditis and pleurisy, fibroid pneumonia, edema of lungs, congestion of lungs, arteriosclerosis, parenchymatous degeneration of myocardium. General appearance after death, well nourished. Heart, lower than normal, myocardium is dark red in color, soft and flabby, endocardium is grayish-white and somewhat uniformly thickened, the mitral valve segments are thickened, tricuspid valve practically normal. Kidneys, left, one hundred and fifty grams; right, one hundred and forty grams; reddish-brown in color, cut with increased resistance, capsule strips with some difficulty, surface granular, capsule thickened, cut surface is reddish-brown, cortex from 4 to 7 mm., whitish lines are seen to alternate with reddish streaks in the cortex, pyramids are dark in color and not elevated or swollen, cortex does not bulge. One and one-half kidneys cut into one hundred sections.

Microscopic study: Three specimens in paraffin studied. Kidney investment normal. Malpighian bodies closer to investment than normally; five or six in one specimen touching investment. Glomeruli congested, vacuolated, one to two lines space between glomerulus and capsule. Bowman's capsule usually slightly thickened in a peculiar fibrous way. The glomerulus sometimes shows this peculiar fibrous condition. Convoluted tubules generally slightly dilated, epithelium disintegrated, basement membrane stands out evidently. Medullary rays like convoluted tubules, namely, epithelium disintegrated and almost unrecognizable on account apparently of distention of blood-vessels between. Cortex, congestion not recorded; a few hyaline casts.

Interstitial tissue in cortex between tubules evidently thickened, though not everywhere. Blood-vessels show some thickening of intima, but not marked. Pretty nearly one continuous focal interstitial area under investment. In the focal interstitial areas glomeruli sometimes fibrous with Bowman's capsule fibrous. These focal interstitial areas showed advanced fibrous tissue formation with no appearance of degeneration into fibroid. These areas contain but few hyaline casts. The tubules in them are shrunken and are frequently devoid of epithelium; the capillaries are dilated and filled with blood. Pyramids congested; interstitial tissue increased. Diagnosis, chronic focal interstitial nephritis, beginning chronic general interstitial nephritis.

Case No. A-1903. Philadelphia Hospital. Age, fifty. Female. White. American. Entered hospital 2-19-'01; died 12-8-'05. Occupation, housewife. Family history, mother died of dropsy. Previous diseases, typhoid fever and pneumonia. No alcoholism. No edema. Bowels, regular. Urine, 2-24-'01, acid, 1027, no albumin or sugar; 11-5-'05, alkaline, 1011, no sugar, trace of albumin, hyaline casts, leucocytes, amorphous phosphates, epithelial cells; 12-3-'05, acid, 1010, no sugar, no albumin, many leucocytes. Pulse, 80 to 100; respiration, 18 to 28; temperature, 98° to 101°.

Pathological diagnosis, fatty infiltration of heart, arteriosclerosis, congestion and edema of lungs, circumscribed gangrene of left lung, chronic interstitial nephritis, congestion of liver, cholelithiasis, fibromyoma of uterus. General appearance after death, fairly well nourished. Heart, three hundred and twenty grams, right auricle contains small quantity of blood, muscle fairly red in color, very soft and friable, endocardium slightly gray, mitral leaflet shows decided thickening, aorta shows several elevated yellowish patches. Kidneys, left, one hundred and twenty grams; right, one hundred and twenty grams; capsule strips readily, some parts of surface granular, section shows grayish cortex which at some points appears slightly swollen. Two kidneys cut into one hundred and thirty sections; one cyst size of pea and one or two small ones; one yellowish speck under cortex.

Microscopic study: Eight specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, somewhat swollen, two lines space between glomerulus and capsule, rarely glomeruli and Bowman's capsule hyaline. Bowman's capsule usually normal, frequently thickened and then decidedly thickened. Convoluted tubules near investment are usually dilated, epithelium disintegrated, sometimes necrotic and practically always separated *en masse* from its base; toward pyramids epithelium disintegrated, necrotic but not desquamated. Medullary rays not recorded. Cortex slightly congested; hyaline

casts. Interstitial tissue in cortex thickened. Blood-vessels, decidedly thickened intima. No focal interstitial areas. Several areas of round-cell infiltration under investment. Pyramids slightly congested; interstitial tissue markedly increased. The yellowish looking speck is apparently a very small (0.5 mm.) hypernephroma. Quite a number (twelve in one specimen) of hyaline masses about size of glomeruli, but not glomeruli. Diagnosis, beginning chronic general interstitial nephritis.

Case No. A-1907. Philadelphia Hospital. Age, sixty-eight. Male. White. American. Entered hospital 9-20-'05; died 12-9-'05. Occupation, with minstrels. Family history, father died of paralysis, mother died of pneumonia, one sister died of consumption. No previous diseases. Alcoholism, not recorded. Edema, not recorded. Bowels, loose. Urine, 9-23-'05, very feebly acid, 1002, trace of albumin, hyaline casts, leucocytes, epithelial cells; 11-23-'05, alkaline, 1023, few leucocytes, few red blood-corpuscles, epithelial cells, debris, triple and amorphous phosphates; 12-8-'05, alkaline, 1016, few epithelial cells, triple and amorphous phosphates. Pulse, 70 to 120; respiration, 20 to 40; temperature, 98° to 103.4°.

Pathological diagnosis, hypertrophy of left ventricle, general arteriosclerosis, bilateral chronic pleuritis, congestion and edema of lungs, chronic interstitial nephritis, cholelithiasis, Meckel's diverticulum. General appearance after death, well nourished. Heart, four hundred and thirty grams, filled with clotted blood, particularly right side, left ventricle greatly increased in size, aorta stiffened by fibrous changes. Kidneys, left, one hundred and forty grams; right, one hundred and thirty grams; surrounded by very thick layers of fat, firmly adherent to capsule, surface very granular, shows a few tiny cysts beneath the capsule, organ cuts with difficulty, cut surface shows narrow cortex grayish in color, pelvis contains considerable amount of fat. One kidney cut into fifty-one sections.

Microscopic study: Seven specimens in paraffin studied. Kidney investment normal or slightly thickened. Connective tissue under investment markedly thickened. Convoluted tubules under investment somewhat distended, epithelium atrophic, slightly disintegrated. Quite numerous islands of thickened connective tissue throughout glomerular part of cortex. Glomeruli swollen, congested and vacuolated, one to two lines space between glomerulus and capsule. Bowman's capsule slightly thickened. Convoluted tubules, epithelium in quite a number swollen, degenerated, even necrotic, but rarely disintegrated; many convoluted tubules show desquamated necrotic epithelium. Medullary rays not recorded. Cortex, congestion not recorded. Interstitial tissue in cortex thickened. Blood-vessels thickened; evident

endarteritis. Several rather typical focal interstitial areas showing numerous filled blood-vessels and rather considerable infiltration. Several areas of round-cell infiltration under investment and about glomeruli. Many hyaline casts both in and out of focal interstitial areas. A few hyaline glomeruli, especially in fibrous areas. Pyramids not congested; interstitial tissue markedly thickened; no casts. Diagnosis, chronic general interstitial nephritis, possibly beginning as a chronic focal interstitial nephritis.

Case No. A-1920. Philadelphia Hospital. Age, sixty-one. Female. White. Widow. Ireland. Entered hospital 11-27-'05; died 12-18-'05. Occupation, housework. Family history, mother and father dead; cause and age unknown. Previous disease, typhoid fever. No alcoholism. No edema. Bowels, constipated. Urine, 12-12-'05, acid, 1016, trace of albumin, numerous leucocytes and epithelial cells. Pulse, 80 to 120; respiration, 20 to 25; temperature, 97° to 98.5°.

Pathological diagnosis, croupous pneumonia of right and left lower lobes, emphysema and edema of lungs, mitral and aortic stenosis, atheroma of coronary arteries, parenchymatous nephritis, nutmeg liver. General appearance after death, emaciated. Heart, two hundred and eighty grams, well covered with pericardial fat, a chicken-fat clot extending into the pulmonary artery, mitral valves firmly adherent on account of calcareous infiltration and shortening of the chordæ tendineæ. Kidneys, left, one hundred and twenty grams; right, one hundred and ten grams; covered by fat, capsule strips readily, cortex diminished, yellowish, showing contrast with pyramids. Two kidneys cut into one hundred and sixty sections; one kidney shows a hydro-nephrosis and one small cyst.

Microscopic study: Eight specimens in paraffin studied. Kidney investment normal. Several Malpighian bodies closer to investment than normally. Glomeruli enlarged, slightly vacuolated, some congested, one line space between glomerulus and capsule. Bowman's capsule thickened. Convoluted tubules near investment dilated, empty, epithelium more or less atrophic and sometimes necrotic; near pyramids sometimes dilated, sometimes normal, usually filled with débris or casts, epithelium degenerated, necrotic, and at edges disintegrated. Medullary rays not distinguished. Cortex, congestion not recorded; numerous hyaline casts. Interstitial tissue in cortex thickened. Blood-vessels distinctly thickened and show endarteritis. Five focal interstitial areas, all short. In one a Malpighian body with slight proliferation of the epithelium lining Bowman's capsule. In another a Malpighian body completely hyaline, surrounded by round cells. Several areas of round-cell infiltration under investment. Focal interstitial areas are found scattered

all through cortex, especially about blood-vessels. Pyramids not congested; interstitial tissue markedly thickened; hyaline casts. One area of markedly thickened connective tissue in pyramid (0.5 mm.) looking like a healed tubercle. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis.

Case No. A-1928. Philadelphia Hospital. Age, forty-nine. Male. White. Ireland. Entered hospital 8-21-'03; died 12-23-'05. Occupation, laborer. Family history, negative. Previous disease, measles. Alcoholism, not recorded. No edema. Bowels, constipated. Urine, not recorded. Pulse, 80 to 90; respiration, 20 to 25; temperature, 97° to 98.5°.

Pathological diagnosis, rupture of aorta, chronic interstitial nephritis, acute nutmeg liver, congestion of spleen, atheromatous arteries in fatty stage. General appearance after death, well nourished. Heart, seven hundred and fifty grams, myocardium is thickened and firm, atheroma of aortic valve. Kidneys, left, one hundred and sixty grams; right, one hundred and fifty grams; small and red, cut with increased resistance, capsule does not strip readily and leaves a granular surface, cut surface drips blood, cortex irregularly thinned, pyramids dark in color. Two kidneys cut into one hundred and twenty sections; many small cysts from pin-head to pea. Four small tumor-like masses under investment.

Microscopic study: Twenty-eight specimens in paraffin studied. Kidney investment normal or thinner. Malpighian bodies in rows immediately under investment. Almost no tubules near investment, but many round cells and considerable connective tissue. One small 0.5 by 1 mm. area immediately under investment, looking like a hypernephroma. One bunch of tubules (the nearest to investment) 0.3 mm. from investment dilated, epithelium atrophic. Malpighian bodies near investment almost all hyaline, some in purplish concentric rings, looking like the pearly bodies in epithelioma. Glomeruli generally shrunken, congested, vacuolated. Bowman's capsule evident but not thickened. Convoluted tubules everywhere dilated, epithelium atrophic. Medullary rays indistinguishable. Cortex here and there congested; very numerous hyaline casts. General marked thickening of interstitial tissue in cortex. Blood-vessels show marked endarteritis. No focal interstitial areas or areas of round-cell infiltration. Pyramids congested; interstitial tissue markedly thickened; numerous hyaline casts. The tumor areas are hypernephromata, except one in the center of a pyramid which looks like a healed tubercle. Diagnosis, chronic general interstitial nephritis, hypernephroma.

Case No. A-1981½. Philadelphia Hospital. Age, fifty-three. Male. White. Married. German. Entered hospital 9-2-'05; died 1-25-'06.

Occupation, driver of beer wagon. Family history, mother died at age of fifty-three, cause of death said to be dropsy; father died at sixty, cause unknown. Previous disease, gonorrhea. Patient alcoholic. No edema. Bowels, regular. Urine, 9—4—'05, 1025, alkaline, no sugar or albumin, phosphates and epithelial cells; 1—20—'06, alkaline, 1020, albumin present, leucocytes and epithelial cells, many hyaline casts. Pulse, 100 to 110; respiration, 25 to 30; temperature, 98° to 99°.

Pathological diagnosis, hypertrophy of heart, acute fibrinous bronchitis, area of softening following occipital lobe of the left hemisphere, also of left lateral area of cerebellum. General appearance after death, well nourished. Heart, eight hundred grams, very much hypertrophied, left ventricular cavity somewhat dilated, aortic valve slightly thickened. Kidneys, left, two hundred and fifty grams; right, two hundred grams; capsule strips with slight difficulty, there are several small scars or cysts, cortex is of average width, whole organ fibrous. One kidney cut into sixty sections; one depressed scar at one end.

Microscopic study: Sixteen specimens in paraffin studied. Kidney investment thinner than normal. Malpighian bodies normally distant from investment. Glomeruli normal size, congested, vacuolated, two, three, or four lines space between glomerulus and capsule, not infrequently the space is filled with debris showing a certain amount of blood coloring-matter. Bowman's capsule normal. Convoluted tubules under investment dilated, epithelium degenerated, disintegrated, and necrotic; elsewhere convoluted tubules slightly dilated, epithelium swollen, degenerated, disintegrated, and occasionally necrotic. Medullary rays same as latter. Cortex generally somewhat congested; numerous hyaline casts. Interstitial tissue in cortex very slightly thickened. Blood-vessels normal. No focal interstitial areas, or areas of round-cell infiltration. Pyramids congested; interstitial tissue increased; no casts. Two or three microscopic cysts size of glomeruli; one microscopic tubule cyst; a rare hyaline glomerulus. The macroscopic scar is made up of fibrous tissue showing shrunken tubules, shriveled and fibroid Malpighian bodies, and is probably a healed infarct. Diagnosis, chronic parenchymatous nephritis, old infarct.

Case No. A-2019. Philadelphia Hospital. Age, sixty-nine. Female. Black. Widow. American. Entered hospital 1—29—'06; died 2—21—'06. Occupation, housework. Family history, mother died of paralysis, father of unknown disease, husband of accident. Previous diseases, measles, chicken-pox, diphtheria, tonsillitis, pneumonia, malaria. Patient alcoholic. No edema. Bowels, regular. Urine, acid, 1015, uric acid crystals, few epi-

thelial cells. Pulse 80 to 110; respiration, 20 to 30; temperature, 97° to 98.5°.

Pathological diagnosis, pleuritic adhesions, chronic endocarditis, aortic sclerosis, parenchymatous nephritis, fibrosis of uterus, chronic salpingitis. General appearance after death, well nourished. Heart, two hundred and ninety grams, normal in size and appearance, milk spot about 2 cm. in diameter, right ventricle contains thrombus, interior of aorta shows considerable sclerosis without much atheroma. Kidneys, left, one hundred and sixty grams; right, one hundred and sixty grams; capsule strips easily, slight parenchymatous change. Two kidneys cut into one hundred and sixty sections; one large cyst size of hazelnut, one size of pea, two or three microscopic; three suspicious specks, one at extreme end of kidneys, one in center of pyramid, one near papilla of pyramid; one large scar on surface.

Microscopic study: Thirty-three specimens in paraffin studied. Kidney investment normal. Malpighian bodies a little closer to investment than normally. Glomeruli congested, vacuolated, rarely fibroid, one to two lines space between glomerulus and capsule, space usually empty, sometimes a small amount of granular debris, sometimes one or two shriveled necrotic epithelial cells. Bowman's capsule thickened. Convoluted tubules usually slightly dilated, epithelium usually atrophic, granular degenerated, lumen usually contains some or is filled with granular debris and rarely one or two desquamated necrotic epithelial cells. Medullary rays like convoluted tubules. Cortex slightly congested; one or two hyaline casts and one or two small fibrous areas. Interstitial tissue in cortex usually not thickened, sometimes slightly thickened, especially under investment. Blood-vessels show endarteritis, one absolutely obliterated. Two or three small focal interstitial areas under investment. Two or three small areas of round-cell infiltration under investment. Pyramids congested; interstitial tissue markedly increased; numerous hyaline casts. The suspicious specks were an area of connective tissue in pyramids, a blood-vessel, and an area of rather dense fibrous tissue in cortex looking as if it had undergone fatty degeneration. Underneath the scar are found about half a dozen small areas of round-cell infiltration in which the glomeruli are fibroid and are close to investment. Diagnosis, mild chronic parenchymatous nephritis, slight chronic focal interstitial nephritis.

Case No. A-2069. Philadelphia Hospital. Age, thirty-seven. Male. Black. Married. American. Entered hospital 7-27-'05; died 3-17-'06. Occupation, laborer. Family history, negative. Previous diseases, whooping-cough, measles. Patient alcoholic. No edema. Bowels, constipated.

Urine, 7—28—'05, acid, 1022, no albumin, few leucocytes, few epithelial cells; 9—15—'05, acid, 1018, no albumin, few leucocytes and epithelial cells; 9—28—'05, alkaline, 1014, no albumin, few leucocytes and epithelial cells; 3—9—'06, acid, 1028, no albumin, few red blood-cells, some leucocytes. Pulse, not recorded; respiration, 15 to 30; temperature, 95° to 100°.

Pathological diagnosis, hypostatic congestion and edema of lungs, chronic adhesive pleurisy, cyanotic induration of spleen, follicular enteritis, hepatic congestion, cyanotic kidney, purulent meningitis. General appearance after death, well nourished. Heart, two hundred and eighty grams, normal. Kidneys, left, one hundred and eighty grams; right, one hundred and ninety grams; somewhat enlarged, capsule contains but little fat, organ normal shape and dark red in color, loose and flabby in texture, capsule strips with some difficulty, is of normal thickness; section-surface smooth, cuts with normal resistance, and is uniformly dark red in color; cortex, average 8 mm. in thickness, vessels of pyramids stand out prominently by their congestion. Two kidneys cut into one hundred and sixty sections.

Microscopic study: Eleven specimens in paraffin studied. Kidney investment slightly thickened. Glomeruli not congested, occasionally vacuolated, one line space between glomerulus and capsule, space empty. Bowman's capsule slightly thickened, frequently normal. Malpighian bodies rarely hyaline. Convoluted tubules, lumen somewhat smaller than normally, epithelium swollen, granular, degenerated, sometimes necrotic, no desquamation, lumen sometimes contains granular debris. Medullary rays the same. Cortex not congested; no casts. Interstitial tissue in cortex generally thickened. Blood-vessels usually normal, sometimes slight endarteritis. Sometimes capillaries between tubules and in glomerulus dilated and filled with red blood-corpuscles. Focal interstitial areas not recorded. Pyramids not congested; interstitial tissue increased; no casts. Diagnosis, beginning chronic general interstitial nephritis.

Case No. A-2097. Philadelphia Hospital. Age, sixty-three. Male. White. Widower. American. Entered hospital 2—24—'06; died 3—30—'06. Occupation, salesman. Family history, father and mother died of cause unknown, wife died of cancer of breast. No previous diseases. No alcoholism. Edema of legs. Bowels, regular. Urine, 2—25—'06, faintly alkaline, 1022, very small amount of albumin, a few leucocytes, a few epithelial cells; 3—27—'06, acid, 1022, no albumin, many granular casts, many hyaline casts, few leucocytes, few epithelial cells, several uric acid crystals. Pulse, 70 to 140; respiration, 20 to 35; temperature, 97° to 102°.

Pathological diagnosis, hypertrophy and dilatation of heart, mitral stenosis

and regurgitation, chronic passive congestion of liver, chronic interstitial nephritis, congestion and edema of lungs. General appearance after death, well nourished. Heart, four hundred and eighty grams, somewhat larger than normal, mitral sclerosis and dilatation. Kidneys, left, one hundred and twenty grams; right, one hundred and twenty grams; surrounded by a large amount of perirenal fat which is extremely adherent to kidney, firm, cut with increased resistance, capsule strips easily and leaves extremely irregular surface with a number of retractions, most of which have a dark reddish base, surface is grayish-red in color, mottled, cortex narrower than normal and irregular in its width, cortex fairly well differentiated from pyramids. Two kidneys cut into one hundred and forty sections; fetal lobulation evident.

Microscopic study: Ten specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, vacuolated, two lines space between glomerulus and capsule, space empty. Bowman's capsule usually slightly thickened. Convoluted tubules dilated, epithelium atrophic, granular, degenerated, and sometimes necrotic, lumen usually empty, though sometimes contains a small amount of and is sometimes filled with granular detritus; the convoluted tubules are less dilated immediately under the investment than elsewhere, immediately under the investment also the lumen sometimes contains a few desquamated epithelial cells. Medullary rays like convoluted tubules generally. Cortex not congested; an occasional hyaline cast. Interstitial tissue in cortex slightly thickened, here and there quite markedly thickened, though the localized thickening shows no appearance of what have been described as focal interstitial areas. Blood-vessels normal. No focal interstitial areas or areas of round-cell infiltration. Pyramids congested; no casts. Diagnosis, beginning chronic general interstitial nephritis.

Case No. A-2165. Philadelphia Hospital. Age, forty-four. Male. White. Married. Italian. Entered hospital 12-23-'05; died 5-5-'06. Occupation, laborer. Family history, negative. Previous disease, gonorrhea. Patient alcoholic. No edema. Bowels, constipated. Urine, acid, 1022, no albumin or sugar, few leucocytes, red blood-cells, triple phosphates, granular urates. Pulse, 80 to 90; respiration, 20 to 25; temperature, normal.

Pathological diagnosis, hemorrhage into pons, gumma of cerebrum, cloudy swelling of kidneys with passive congestion, congestion and edema of lungs, gumma of liver, bilateral pleurisy, perisplenitis, passive congestion of spleen, dilatation of stomach. General appearance after death, emaciated. Heart, two hundred and sixty grams, small, walls of right side, slightly thinned. Kidneys, left, one hundred and forty grams; right, one hundred and forty

grams; some passive congestion, beginning cloudy swelling. Two kidneys cut into one hundred and sixty sections; one small yellowish nodule.

Microscopic study: Twenty-five specimens in paraffin studied. Kidney investment slightly thickened. Some Malpighian bodies closer to investment than normally. Glomeruli not congested, vacuolated, some fibroid, one line space between glomerulus and capsule. Bowman's capsule thickened. Convoluted tubules show marked post-mortem changes. Medullary rays show post-mortem changes. In these cases showing post-mortem changes the secretory tubules of medullary rays are very evidently differentiated from the non-secretory tubules. Cortex not congested; no hyaline casts. Interstitial tissue in cortex thickened. Blood-vessels rarely slightly thickened. One or two small areas of round-cell infiltration under investment. Pyramids not congested; interstitial tissue increased. The nodule was a large blood-vessel with connective tissue about it. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis.

Case No. A-2180. Philadelphia Hospital. Age, fifty-four. Male. White. Married. American. Entered hospital 2-1-'06; died 5-16-'06. Occupation, engraver. Family history, father died of rheumatism, mother of apoplexy. Previous disease, typhoid. Patient alcoholic. Edema of hands. Bowels, regular. Urine, acid, 1018, no sugar or albumin, granular casts, hyaline casts, urates, epithelial cells. Pulse, 90 to 100; respiration, 25; temperature, normal.

Pathological diagnosis, aortic sclerosis, arteriosclerosis of kidneys, hypertrophy of left ventricle. General appearance after death, somewhat emaciated. Heart, three hundred and forty grams, slightly enlarged from hypertrophy of left ventricle, aortic and mitral valves slightly atheromatous. Kidneys, left, one hundred grams; right, one hundred and ten grams; both kidneys show marked lesions of arteriosclerosis and both contain a few retention cysts. Two kidneys cut into one hundred and fifty sections; numerous small cysts, one cyst size of hazelnut filled with gelatinous material; numerous small fibromata in cortex and pyramids, especially latter.

Microscopic study: Thirty specimens in paraffin studied. Kidney investment normal. Malpighian bodies closer to investment than normally. Glomeruli congested, not vacuolated, frequently fibroid, one to two lines space between glomerulus and capsule, space empty. Bowman's capsule thickened. Convoluted tubules throughout slightly dilated, lumen empty or contains a small amount of granular debris, rarely contains desquamated epithelium. Medullary rays the same. Cortex usually congested; some hyaline casts. Interstitial tissue decidedly thickened under the investment and usually

throughout the cortex. There are, however, islands of convoluted tubules in which no thickening of the interstitial tissue is evident. Blood-vessels thickened everywhere. Pyramids congested; interstitial tissue increased; many hyaline casts. No fibromata found. The appearance of fibromata was produced sometimes by localized focal interstitial areas, again by cysts with homogeneous contents, and apparently once or twice by distended blood-vessels. Diagnosis, chronic general interstitial nephritis beginning as a chronic focal interstitial nephritis.

Case No. A-2197. Philadelphia Hospital. Age, sixty-six. Male. White. Married. English. Entered hospital 2-21-'06; died 5-23-'06. Occupation, shoemaker. Family history, negative. No previous diseases. Patient alcoholic. No edema. Bowels, constipated. Urine, 2-24-'06, acid, 1019, faint trace of albumin, urates, leucocytes, epithelial cells; 5-20-'06, very alkaline, 1022, albumin present, leucocytes, very few crystals, triple phosphates, ammonium urates, epithelial cells. Pulse, 80 to 90; respiration, 25 to 45; temperature, 98° to 101°.

Pathological diagnosis, cardiac dilatation, edema of lungs, mitral sclerosis, arteriosclerosis of kidneys, left-sided pleurisy, cerebral softening, arteriosclerosis, passive congestion of liver, spleen, stomach, and intestines. General appearance after death, well nourished. Heart, five hundred and ninety grams, some hypertrophy, some sclerosis of mitral leaflet, some arteriosclerosis at base of aorta. Kidneys, left, one hundred and seventy grams; right, one hundred and fifty grams; typical of arteriosclerosis. Two kidneys cut into one hundred and thirty sections; small cysts; one small old infarct.

Microscopic study: Sixteen specimens in paraffin studied. Kidney investment thickened. Malpighian bodies closer to investment than normally. Glomeruli not congested, vacuolated, many fibroid, especially in region of infarct, about two lines space between glomerulus and capsule. Bowman's capsule sometimes thickened. Convoluted tubules under investment dilated, epithelium atrophic, disintegrated, necrotic, lumen usually contains a small amount of granular debris; toward pyramids tubules not dilated, epithelium swollen, granular, necrotic. Medullary rays like latter. Cortex congested; no hyaline casts. Interstitial tissue in cortex generally slightly thickened. Blood-vessels thickened. Typical focal interstitial areas and areas of round-cell infiltration under investment. Pyramids congested; interstitial tissue markedly increased; no casts. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis.

Case No. A-6329. Philadelphia Hospital. Age, forty. Male. Black.

American. Entered hospital 10-17-'05; discharged 11-9-'05; re-entered 11-29-'05; died 12-12-'05. Occupation, driver. Family history, father and mother died from unknown cause, one sister died of typhoid. Previous disease, typhoid fever. Patient alcoholic. No edema. Bowels, regular. Urine, 10-18-'05, acid, 1013, sugar and albumin negative, a few leucocytes, some amorphous urates, some epithelial cells; 11-30-'05, acid, 1005, no sugar or albumin, epithelial cells, leucocytes. Pulse, 60 to 80; respiration, 25 to 35; temperature, 97° to 98.2°.

Pathological diagnosis, hypertrophy and dilatation of heart, chronic adherent pleurisy, congestion of lungs, infarcts of kidney, beginning cirrhosis of liver. General appearance after death, well nourished. Heart, six hundred and twenty grams, very large, right auricle distended with fluid blood, walls thin and flabby, left ventricle large, cavity contains fluid blood and blood-clots. Kidneys, left, one hundred and sixty grams; right, one hundred and fifty grams; diminished in size, perirenal structure densely adherent to capsule, organs cut with considerable difficulty, capsule strips with some difficulty, on cut surface several old scars are found, cortex red in color, slightly narrowed, pyramids purplish in color. Two kidneys cut into one hundred and sixty sections; one small cyst.

Microscopic study: Seventeen specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Tubules under investment dilated, epithelium disintegrated. Glomeruli congested, none fibroid, one to two lines space between glomerulus and capsule. Bowman's capsule normal. Convoluted tubules dilated, epithelium disintegrated and frequently desquamated. One line of connective tissue 1 mm. in width through cortex, tubules on either side of this filled with colloid material. The desquamation of the epithelium in the convoluted tubules is only in places. Many areas of localized thickened connective tissue. Cortex, congestion not recorded. Interstitial tissue in cortex generally thickened. Blood-vessels show slight endarteritis. Numerous areas throughout cortex of round-cell infiltration, varying in size from 0.25 mm. to 1 mm. The areas of round-cell infiltration are usually about or adjoining Malpighian bodies, but not always. One hemorrhagic infarct 0.5 to 1 mm. broad and 3 or 4 mm. long. Diagnosis, slight chronic general interstitial nephritis, well-marked chronic focal interstitial nephritis.

Case No. A-6500. Philadelphia Hospital. Age, fifty-one. Male. White. American. Entered hospital 10-5-'05; died 12-9-'05. Occupation fireman. Family history, father and mother dead of cause unknown, one brother dead of diarrhea. Previous diseases, measles, pertussis, scarlet fever,

chicken-pox, grip. Alcoholism, not recorded. No edema. Bowels, regular. Urine, 10-6-'05, acid, 1018, trace of albumin, a few amorphous urates, a few epithelial cells; 10-8-'05, acid, 1010, no sugar or albumin. Pulse, 80 to 110; respiration, 25 to 40; temperature, 94° to 99°.

Pathological diagnosis, hypertrophy and dilatation of heart, fatty degeneration of heart, chronic endocarditis beginning malignant, atheroma of aorta especially about coronary arteries, chronic interstitial nephritis, red atrophy of liver. General appearance after death, well nourished. Heart, seven hundred grams, pericardium covered with considerable fat, right and left ventricles markedly dilated. Kidneys, left, two hundred and ten grams; right, one hundred and seventy grams; normal in size, somewhat pale, cut with resistance, capsule strips with difficulty, cortex narrow at points, swollen at other places, pale, pyramids purplish-red in color, fat contents of pelvis increased. Two kidneys cut into one hundred and twenty sections; surface of one kidney presents four small cysts.

Microscopic study: Eight specimens in paraffin studied. Kidney investment thickened. Malpighian bodies normally distant from investment. Glomeruli slightly congested, not vacuolated, two lines space between glomerulus and capsule. Bowman's capsule normal. Convoluted tubules normal size, epithelium sometimes degenerated and necrotic; near center sometimes whole tubules necrotic. Medullary rays degenerated but not necrotic. Cortex congested; occasional hyaline casts, especially in areas of round-cell infiltration and focal interstitial areas. Interstitial tissue in cortex slightly thickened and here and there evidently thickened. Blood-vessels normal. Several focal interstitial areas throughout cortex. Some areas of round-cell infiltration under investment. Pyramids slightly congested; interstitial tissue increased. One or two scattered hyaline fibroid Malpighian bodies. Cyst under investment with several hyaline fibroid glomeruli in wall. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis.

Case No. A-6959. Philadelphia Hospital. Age, twenty-five. Male. Black. American. Entered hospital 1-23-'06; died 2-4-'06. Occupation, laborer. Family history, father dead of unknown disease, mother of typhoid. Previous diseases, measles, mumps, typhoid, rheumatism. Alcoholism, not recorded. Edema of legs. Bowels, regular. Urine, 1019, alkaline, no albumin, few leucocytes, epithelial cells, red blood-cells, phosphates. Pulse, 100 to 110; respiration, 45 to 50; temperature, 97° to 98°.

Pathological diagnosis, hypertrophy and dilatation of heart, edema of lungs, hemorrhagic infarction of right lung, pneumonia hypostatic, nephritis, anasarca, passive congestion of liver and spleen. General appearance after

death, fairly well nourished. Heart, six hundred and sixty grams, very large and globular in shape, all the chambers are much dilated and the muscular tissue of all is hypertrophied, all the chambers contain currant-jelly clots, aorta was narrow, very elastic, and contains circumscribed atheromatous and sclerosed plaques, the aortic orifice is large, the valves much relaxed, incompetent, inverted and thickened at the edges, and somewhat fibrous throughout, the mitral valve is somewhat sclerotic, the orifice very large, the muscular substance seems unchanged. Kidneys, left, one hundred and ninety grams; right, two hundred grams; about normal in size, extremely hard, unusually thick antero-posteriorly, on section the cortex seems to be normal in proportion to the medulla, is pale in color, whereas pyramids are congested, capsule strips easily but leaves a granular, pale surface. One kidney cut into sixty sections; one pin-head cyst.

Microscopic study: Five specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli swollen, congested, occasionally slightly vacuolated, usually no space, sometimes one line space between glomerulus and capsule. Usually on one side (most frequently opposite the entrance of the vessel) a space is found filled with coagulated material staining light pink. Bowman's capsule normal. Convoluted tubules slightly dilated throughout, lumen frequently contains debris, epithelium degenerated and disintegrated and occasionally necrotic. Cortex slightly congested. Medullary rays same as convoluted tubules. Interstitial tissue in cortex normal. Blood-vessels normal. No focal interstitial areas or areas of round-cell infiltration. Pyramids congested; interstitial tissue slightly increased. Diagnosis, acute parenchymatous nephritis.

Case No. A-6569. Philadelphia Hospital. Age, thirty-seven. Female. White. Married. American. Entered hospital 12-14-'05; died 12-19-'05. Occupation, housework. Family history, negative. Previous diseases, usual mild diseases of childhood. Patient alcoholic. No edema. Bowels, regular. Urine, alkaline, 1019, no albumin, few leucocytes, red blood-cells, few epithelial cells, triple phosphates. Pulse, 80 to 90; respiration, 20 to 25; temperature, 95° to 98°.

Pathological diagnosis, fatty myocarditis, patulous foramen ovale, parenchymatous nephritis, cloudy swelling and early fatty changes in liver, strangulated epiploica appendix, chronic inflammation of stomach. General appearance after death, well nourished. Heart, two hundred and seventy grams, normal position, slight pericardial fluid, epicardial fat well marked, veins congested, right heart contains clots, both fibrinous and currant-jelly, a large

chicken-fat clot occupying the right auriculo-ventricular opening, pulmonary valves normal, muscle slightly softened. Kidneys, left, one hundred and eighty grams; right, one hundred and forty grams; normal as to size, slight uremic odor, capsule strips readily, relation of cortex to medulla normal, firm consistency, slightly gray cortex, fat in pelvis increased. Two kidneys cut into one hundred and sixty sections.

Microscopic study: Five specimens in paraffin studied. Kidney investment thickened. Malpighian bodies normally distant from investment. Glomeruli swollen, vacuolated, not congested, one line space between glomerulus and capsule, rarely two lines space. Bowman's capsule slightly thickened. Convolutated tubules under investment, epithelium swollen, cloudy, and occasionally necrotic; one or two areas near middle of cortex in which convolutated tubules dilated, many tubules showing the epithelium small but emphasized, again the epithelium small and necrotic; the nearer the pyramids, the more swollen and necrotic the epithelium. Medullary rays, epithelium swollen, necrotic. Cortex not congested. Interstitial tissue thickened and edematous all through cortex. Blood-vessels usually normal, intima sometimes thickened, sometimes five to ten layers on one side of vessel. No focal interstitial areas or areas of round-cell infiltration. Pyramids not congested; interstitial tissue increased; no casts. Diagnosis, chronic parenchymatous nephritis.

Case No. A-6580. Philadelphia Hospital. Age, fifty-four. Male. Black. American. Entered hospital 12-19-'05; died 12-21-'05. Occupation, teamster. Family history, not obtainable. Previous diseases, not recorded. Patient alcoholic. No edema. Bowels, constipated. Urine, unable to obtain specimen. Pulse, 90 to 120; respiration, 30 to 35; temperature, 96° to 94°.

Pathological diagnosis, encephaloid cancer of stomach with secondary growth in liver, brown atrophy of heart, arteriosclerosis, amyloid degeneration of liver and kidneys. General appearance after death, emaciated. Heart, two hundred and eighty grams, small, brownish in color. Kidney, left, three hundred and fifty grams; right, four hundred and twenty grams; small, evidently contracted, and has bacony appearance. Two kidneys cut into ninety sections; exterior surface showed one dozen small cysts of split-pea size.

Microscopic study: Eighteen specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested and vacuolated, sometimes amyloid, one line space between glomerulus and capsule. Bowman's capsule usually thickened. Convolutated tubules sometimes somewhat dilated, lumen filled everywhere with granular debris and desquamated necrotic epithelium, epithelium degener-

ated and necrotic. Medullary rays not distinguishable. Cortex not congested; hyaline casts. Interstitial tissue in cortex everywhere slightly thickened and usually markedly thickened. Blood-vessels usually normal, but in focal interstitial areas endarteritis, sometimes even obliterative. Pyramids not congested; interstitial tissue markedly increased; a few hyaline casts. In places the specimen looks like chronic desquamative nephritis, in others like chronic general interstitial nephritis; the latter predominated. One small (1 mm.) metastatic carcinoma. Diagnosis, amyloid degeneration; chronic general interstitial nephritis, chronic focal interstitial nephritis, metastatic carcinoma.

Case No. A-6656. Philadelphia Hospital. Age, fifty. Male. White. Poland. Entered hospital 12-27-'05; died 12-29-'05. Occupation, iron-worker. Patient unable to speak English, therefore history not obtainable. Edema of hands and feet. Bowels, constipated. Urine, acid, 1015, no sugar, albumin present, hyaline casts, leucocytes and epithelial cells. Pulse, 100; respiration, 20 to 50; temperature, 94° to 98.8°.

Pathological diagnosis, hemo-pericardium with puncture of anterior wall of right ventricle, hypertrophy of heart, hemohydrothorax, pleuritis, atelectasis of left lung, hypostatic congestion of lungs, chronic interstitial nephritis, fatty atheromatous arteries, cirrhosis of liver, catarrhal colitis, gastritis, general anasarca, phimosis with gangrene of penis. General appearance after death, well nourished. Heart, seven hundred and sixty grams, muscle firm, reddish-brown color, endocardium shows evidence of thickening and sclerosis, especially marked on segments of aortic valves. Kidneys, left, one hundred and fifty grams; right, one hundred and forty grams; small, cut with increased resistance, capsule strips easily, surface slightly granular, cortex irregularly thinned, pyramids prominent, purplish color, abundance of fat in pelvis, one cyst measuring 2 cm. in diameter which is filled with tinted, straw-colored fluid. Two kidneys cut into one hundred and sixty sections; two yellowish tumors found in pyramids; decomposition evident.

Microscopic study: Twenty-four specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli swollen, usually congested, rarely vacuolated, one to two lines space between glomerulus and capsule. Bowman's capsule shows the connective tissue thickened and rarely a suspicion of proliferation of the epithelium. Occasional hyaline Malpighian bodies. Convoluted tubules, epithelium swollen, cloudy, disintegrated, and necrotic. Medullary rays the same. Cortex, rare areas congested. Interstitial tissue in cortex thickened. Blood-vessels not recorded. No typical focal interstitial areas. Two rather indefinite small

areas of round-cell infiltration under investment with broken-up tubules, dilated blood-vessels filled with blood, one or two hyaline Malpighian bodies, and several hyaline casts. Pyramids congested; interstitial tissue increased. One hypernephroma under investment. In some specimens quite considerable thickening of the interstitial tissue. Two masses in pyramids composed of dense connective tissue. Diagnosis, slight chronic general interstitial nephritis, hypernephroma.

Case No. A-6758. Philadelphia Hospital. Age, thirty-seven. Female. Black. American. Entered hospital 6-15-'05; died 1-12-'06. Occupation, housework. Family history, mother died of heart trouble, one brother and three sisters died in infancy. No previous diseases. Patient alcoholic. Edema of legs and ascites. Bowels, regular. Urine, 6-17-'05, acid, 1020, slight trace of albumin, granular and hyaline casts, and leucocytes; 9-27-'05, dark straw color, cloudy sediment, feebly acid, 1018, albumin present, many epithelial cells and leucocytes. Pulse, 80 to 110; respiration, 25 to 40; temperature, 95° to 99°.

Pathological diagnosis, hypertrophy and dilatation of heart, double pleural effusion, chronic pleuritis, edema and congestion of lungs, perisplenitis, fatty cirrhosis of liver, perihepatitis, ascites, fibrinous peritonitis, catarrhal endometritis, fibrosis of ovaries. General appearance after death, well nourished. Kidneys, left, two hundred and forty grams, pale, rather firm in consistency, capsule strips readily except at one point, where it is firmly adherent, on cut section cortex is not reduced in thickness, pyramids show faintly; right, one hundred and ninety grams, slightly smaller than left, capsule slightly adherent, pale in color and rather flabby, one section cortex slightly narrowed. One kidney cut into eighty pieces.

Microscopic study: Number of specimens not recorded. Kidney investment thinner than normal. Malpighian bodies normally distant from investment. Glomeruli swollen, congested, vacuolated, two to three lines space between glomerulus and capsule. Bowman's capsule shows here and there proliferation of epithelium, and its connective tissue is usually thickened. Convoluted tubules dilated, epithelium degenerated, disintegrated, necrotic. Medullary rays not recorded. Little or no congestion of cortex generally; occasional hyaline casts. Interstitial tissue in cortex thickened. Blood-vessels normal. Two very small focal interstitial areas under investment; two or three larger ones a little distance from investment, and two or three still larger scattered through cortex. Pyramids not congested; interstitial tissue increased. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis.

Case No. A-7351. Philadelphia Hospital. Age, seventeen. Male. White. Single. American. Entered hospital 3-9-'06; died 3-18-'06. Occupation, laborer. No family history obtained. Previous diseases, not recorded. Alcoholism, not recorded. No edema. Bowels, regular. Urine, acid, 1023, albumin, no sugar, few granular casts, few epithelial cells. Pulse, 100 to 130; respiration, 25 to 35; temperature, 98° to 102°.

Pathological diagnosis, typhoid fever, lobar pneumonia, cloudy swelling of kidneys, acute splenic tumor. General appearance after death, emaciated. Heart, two hundred and forty grams, normal in size, left heart dilated, right heart moderately contracted. Kidneys, left, one hundred and forty grams; right, one hundred and fifty grams; color somewhat grayer than usual, capsule strips easily, leaves smooth surface, veins congested, cut surface shows cortex wider than normal. Two kidneys cut into one hundred and sixty sections.

Microscopic study: Eight specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, vacuolated, one to two lines space between glomerulus and capsule, space usually empty, sometimes a small amount of granular debris. Bowman's capsule normal. Convoluted tubules slightly dilated everywhere, lumen usually empty, sometimes hyaline casts, epithelium somewhat atrophic, granular, degenerated, sometimes necrotic. Medullary rays the same. Cortex congested. Interstitial tissue in cortex normal. Blood-vessels normal. No focal interstitial areas or areas of round-cell infiltration. Pyramids congested; interstitial tissue slightly increased; no casts. The dilated tubules resemble the dilated tubules in interstitial nephritis, yet the blood-vessels are normal and there is no thickening of the interstitial tissue. Diagnosis, mild acute parenchymatous nephritis.

Case No. A-7358. Philadelphia Hospital. Age, thirty-three. Male. White. Italian. Entered hospital 3-17-'06; died 3-19-'06. Occupation, laborer. No history obtainable. Bowels, loose. Urine, 3-17-'06, acid, 1018, epithelial cells, leucocytes. Pulse, 120 to 130; respiration, 35; temperature, 98° to 102°.

Pathological diagnosis, lobar pneumonia, atrophic cirrhosis of liver, splenomegaly, chronic catarrhal colitis. Heart, two hundred and ninety grams, normal in size, right and left heart moderately dilated, right heart filled with chicken-fat clot, muscle flabby, leaflets show no abnormalities. Kidneys, left, one hundred and seventy grams; right, two hundred grams; capsule strips easily, cut surface grayish-pink in color, cortex normal in size, pyramids not particularly differentiated, on convex surface are two small retracted areas with grayish-black bases running for a short distance in a

pyramidal form. Two kidneys cut into one hundred and seventy sections; two specks looking like tubercles.

Microscopic study: Twenty-seven specimens in paraffin studied. Kidney investment normal. Malpighian bodies a little closer to investment than normally. Glomeruli congested, slightly vacuolated, three or four lines space between glomerulus and capsule or even more, space usually contains considerable granular debris. Bowman's capsule thickened; no proliferation of epithelium. Convoluting tubules, lumen dilated and sometimes contains a small amount of granular debris and rarely a few degenerated epithelial cells, epithelium swollen, granular, degenerated, sometimes fatty degenerated, rarely necrotic. Medullary rays the same. Cortex somewhat congested; no casts. Interstitial tissue thickened, especially for some distance under investment, also slightly throughout cortex. Blood-vessels, distinct endarteritis. No focal interstitial areas or areas of round-cell infiltration under investment. Pyramids not congested; interstitial tissue increased; no casts. One of the suspicious specks seen macroscopically is a mass of fibrous tissue in a pyramid looking like a healed tubercle. The other suspicious speck is a mass in the cortex near the investment, half cellular, half fibrous. One cyst in cortex. Diagnosis, beginning chronic general interstitial nephritis.

Case No. A-7954. Philadelphia Hospital. Age, sixty-nine. Male. White. Married. American. Entered hospital 4-11-'06; died 5-5-'06. Occupation, shoemaker. Family history, negative. Previous disease, gonorrhea. Patient alcoholic. No edema. Bowels, loose. Urine, 4-12-'06, acid, 1010, no albumin or sugar. Pulse, 90 to 100; respiration, 20 to 25; temperature, normal.

Pathological diagnosis, edema of lungs, brown atrophy of heart, chronic endocarditis, perisplenitis, arteriosclerosis of kidneys, fatty infiltration of liver, thrombosis of aorta. General appearance after death, emaciated. Heart, two hundred and forty grams, small, firm, aortic valve sclerotic and retracted. Kidneys, left, one hundred and twenty grams; right, one hundred and twenty grams; firm in consistency, capsule strips easily, cortex not noticeably narrowed. Two kidneys cut into one hundred and sixty sections; three or four suspicious looking fibromata.

Microscopic study: Twenty specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, vacuolated, one to two lines space between glomerulus and capsule, space empty. Bowman's capsule thickened, an occasional Malpighian body fibroid with evident proliferation of the epithelium of Bowman's capsule. Convoluting tubules everywhere dilated, lumen sometimes con-

tains small amount of granular debris, epithelium atrophic, degenerated, and sometimes necrotic, frequently containing vacuoles looking like fat droplets. Medullary rays the same. Cortex not congested; a few hyaline casts. Interstitial tissue in cortex thickened. Blood-vessels thickened, evident endarteritis. Small focal interstitial areas under investment and throughout cortex. Pyramids not congested; interstitial tissue markedly thickened; few hyaline casts. Small tumor in pyramid looking like hypernephroma. One old infarct showing numerous Malpighian bodies fibroid, numerous hyaline casts and considerable interstitial infiltration. No fibromata found. Diagnosis, mild chronic general interstitial nephritis, chronic focal interstitial nephritis.

Case No. A-7963. Philadelphia Hospital. Age, not recorded. Male. White. American. Condition in life, not recorded. Entered hospital 5-4-'06; died 5-5-'06. Occupation, not recorded. Family history, negative. Previous diseases, not recorded. Patient alcoholic. No edema. Bowels, regular. Urine, 5-4-'06, acid, 1029, albumin present, granular and hyaline casts, epithelial cells, crystals. Pulse, respiration, and temperature, not recorded.

Pathological diagnosis, myocarditis, edema and congestion of lungs, fatty infiltration of liver, chronic parenchymatous and slight interstitial nephritis, fracture of base of skull. General appearance after death, well nourished. Heart, three hundred and seventy grams, flabby, muscle pale, ventricles slightly distended. Kidneys, left, one hundred and sixty grams; right, one hundred and sixty grams; flabby in consistency, removal of capsule tears kidney substance in places, surface dark and mottled, cortex uneven in width. Two kidneys cut into one hundred and sixty sections; five or six small, yellowish specks in cortex.

Microscopic study: Thirty-two specimens in paraffin studied. Kidney investment normal or slightly thickened. Malpighian bodies normally distant from investment, many hyaline fibroid Malpighian bodies, glomeruli congested, vacuolated, one to two lines space between glomerulus and capsule, space usually contains a few desquamated epithelial cells. Bowman's capsule thickened and in focal interstitial areas markedly so; slight proliferation of epithelium of Bowman's capsule. Convoluted tubules slightly dilated, lumen usually contains desquamated epithelium, epithelium granular, degenerated, and necrotic. Medullary rays not found. Cortex not congested; no hyaline casts. Interstitial tissue in cortex slightly thickened and in numerous focal interstitial areas markedly so. Blood-vessels sometimes show endarteritis. Numerous focal interstitial areas under investment and throughout cortex. Pyramids congested; interstitial tissue increased; no hyaline casts.

Suspicious looking specks were focal interstitial areas. Diagnosis, chronic parenchymatous nephritis, chronic focal interstitial nephritis.

Case No. A-7966. Philadelphia Hospital. Age, thirty-seven. Male. Black. Married. American. Entered hospital 4-27-'06; died 5-7-'06. Occupation, contractor. Family history, negative. Previous disease, kidney trouble. No alcoholism. Edema of feet, legs, arms, back, face, flanks. Bowels, regular. Urine, acid, 1021, albumin present, no sugar, finely and coarsely granular hyaline casts, few epithelial cells. Pulse, respiration, and temperature, not recorded.

Pathological diagnosis, parenchymatous nephritis, hypertrophy and dilatation of heart, congestion and edema of lungs, hydrothorax, ascites, perihepatitis, perisplenitis. General appearance after death, well nourished. Heart, twice normal in size, hypertrophy and dilatation. Kidneys, normal in size, capsule strips easily, surface slightly granular, cortex not increased, some passive congestion. Two kidneys cut into one hundred and sixty sections; one fibroma in cortex; several small cysts.

Microscopic study: Fifteen specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Glomeruli congested, slightly vacuolated, one line or no space between glomerulus and capsule, space empty. Bowman's slightly thickened. Convoluted tubules under investment slightly dilated, lumen empty, everywhere epithelium swollen, cloudy, sometimes degenerated and sometimes necrotic. Medullary rays usually show no lumen, epithelium swollen, cloudy, and sometimes necrotic. Cortex, especially under investment, congested; no casts. Interstitial tissue in cortex not thickened. Blood-vessels normal. No focal interstitial areas or areas of round-cell infiltration. Pyramids not congested; interstitial tissue slightly increased; no casts. What appeared like a fibroma in the cortex is simply a mass of connective tissue with tubules through it. Diagnosis, mild acute parenchymatous nephritis.

Case No. A-8155. Philadelphia Hospital. Age, fifty-seven. Female. Black. Married. Entered hospital 12-31-'05; died 5-23-'06. Occupation, housework. Family history, father died of accident, mother of heart disease. Previous diseases, asthma, apoplectic stroke, diseases of childhood. No alcoholism. Edema present. Bowels, constipated. Urine, 12-31-'05, acid, 1010, trace of albumin, hyaline casts, leucocytes, epithelial cells; 1-9-'06, acid, 1010, no albumin, leucocytes, red blood-cells, epithelial cells, amorphous urates. Pulse, 80 to 120; respiration, 20 to 35; temperature, 98° to 99°.

Pathological diagnosis, hyperplasia of thyroid (goitre), hypertrophy and

dilatation of heart, general arteriosclerosis, diffuse nephritis with arteriosclerosis, left-sided pleurisy, bilateral effusions, ascites, cystitis, hernia of appendix, passive congestion of liver, spleen, and lungs, edema of lungs. General appearance after death, well nourished. Heart, five hundred grams, twice usual size, right auricle much distended, right ventricle hypertrophied and dilated, left auricle somewhat dilated, left ventricle hypertrophied. Kidneys, left, two hundred and thirty grams; right, two hundred and fifty grams; almost twice normal size, capsule strips with difficulty, surface granular. Two kidneys cut into one hundred and ninety sections; many small cysts, pinpoint to split-pea, found especially in the pyramids.

Microscopic study: Twenty-five specimens in paraffin studied. Kidney investment normal. Malpighian bodies closer to investment than normally. Glomeruli congested, vacuolated, one to two lines space between glomerulus and capsule, space empty. Bowman's capsule slightly thickened. Convoluted tubules under investment dilated, epithelium atrophic, granular, and necrotic, lumen usually empty, sometimes contains a small amount of granular debris, sometimes a few desquamated cells; near pyramids not so dilated, epithelium about the same, lumen usually contains granular debris. Medullary rays the same as latter, but epithelium not quite so atrophic or necrotic. Cortex not congested. Interstitial tissue in cortex generally very slightly thickened, about as would be seen in a chronic parenchymatous condition. Here and there, however, the interstitial tissue is markedly thickened and shows blood-vessels with intense endarteritis. In these areas also the Malpighian bodies are somewhat shriveled and show Bowman's capsule markedly thickened. Blood-vessels show endarteritis. Typical focal interstitial areas and areas of round-cell infiltration under investment and throughout cortex. Pyramids congested; interstitial tissue increased; a few hyaline casts. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis apparently arising about the larger blood-vessels.

Case No. A-8163. Philadelphia Hospital. Age, sixty-six. Male. White. Widower. Germany. Entered hospital 5-19-'06; died 5-23-'06. Occupation, watchman. Family history, father died of accident, mother of senility. No previous diseases. Patient alcoholic. Edema present. Bowels, regular. Urine, 5-20-'06, faintly alkaline, 1011, few leucocytes, red blood-cells, epithelial cells. Pulse, 80; respiration, 25; temperature, normal.

Pathological diagnosis, arteriosclerosis, slight parenchymatous nephritis, myocarditis, bilateral pleurisy, pleural effusions, passive congestion of liver, spleen, and intestines, perisplenitis. General appearance after death, some-

what emaciated. Heart, slight thickening of ventricular valves. Kidneys, some thickening of cortex, capsule strips easily, no cysts. Two kidneys cut into one hundred and sixty sections; one fibroma in pyramids.

Microscopic study: Twelve specimens in paraffin studied. Kidney investment slightly thickened. Malpighian bodies normally distant from investment. Glomeruli slightly congested, slightly vacuolated, three to four lines space between glomerulus and capsule, space usually empty, sometimes contains red blood-corpuscles, sometimes necrotic epithelium, sometimes debris. Bowman's capsule thickened. Convoluted tubules under investment slightly dilated, epithelium degenerated and rarely necrotic; elsewhere the convoluted tubules show little or no lumen, epithelium swollen, degenerated, and frequently necrotic. Medullary rays like latter. Cortex not congested. A few hyaline casts in tubules. Interstitial tissue in cortex thickened. Blood-vessels usually normal, though frequently show endarteritis. Typical areas of focal interstitial nephritis under investment and throughout cortex. Pyramids not congested; interstitial tissue markedly thickened. Many hyaline plugs near papilla. Typical fibroma in pyramid. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis.

Case No. A-8221. Philadelphia Hospital. Age, fifty-seven. Male. White. Married. German. Entered hospital 5-19-'06; died 5-23-'06. Occupation, salesman. Family history, father and mother died of senility. Previous diseases, not recorded. No alcoholism. No edema. Bowels, constipated. Urine, acid, 1011, trace of albumin, epithelial cells, epithelial casts, leucocytes, red blood-cells, crystals, urates. Pulse, 78 to 110; respiration, 20 to 28; temperature, normal.

Pathological diagnosis, primary carcinoma of pancreas, secondary carcinoma of liver, gall-bladder, lung, omentum, and mesentery, chronic parenchymatous nephritis, arteriosclerosis, hemorrhage into intestines and gall-bladder. General appearance after death, well nourished. Heart, four hundred and ten grams, excessive fatty changes, right auricle distended. Kidneys, left, one hundred and ninety grams; right, one hundred and eighty grams; larger than normal, slight thickening of cortex, some lobulation, passive congestion, capsule strips easily. Two kidneys cut into one hundred and forty sections; a few small cysts.

Microscopic study: Fifteen specimens in paraffin studied. Kidney investment normal. Malpighian bodies normally distant from investment. Considerable connective tissue under investment and extending in areas about half-way through cortex. Glomeruli congested, vacuolated, one to two lines space between glomerulus and capsule, space empty. Bowman's capsule

thickened. Convoluted tubules under investment, many have disappeared due to inroads of the connective tissue, but remaining are about normal in size and shape, lumen usually contains a smaller or larger amount of granular debris, epithelium swollen, granular, and necrotic. Medullary rays the same. Cortex not congested; few hyaline casts. Interstitial tissue in cortex generally thickened, markedly thickened under investment. Blood-vessels sometimes thickened, but not always. No focal interstitial areas or areas of round-cell infiltration. Diagnosis, chronic general interstitial nephritis apparently beginning from the investment.

Case No. A-8334. Philadelphia Hospital. Age, sixty-five. Female. Single. White. Irish. Entered hospital 4-19-'06; died 6-9-'06. Occupation, housework. Family history, negative. No previous diseases. No alcoholism. No edema. Bowels, constipated. Urine, alkaline, 1022, albumin present, pale granular casts, few leucocytes, red blood-cells, triple phosphates, epithelial cells. Pulse, 80 to 140; respiration, 25 to 40; temperature, 98° to 102°.

Pathological diagnosis, general arteriosclerosis and atheroma, brown atrophy and fatty degeneration of heart muscle, aortic and mitral sclerosis, general vesicular emphysema of lungs, slight chronic pleurisy, chronic catarrhal gastritis, slight chronic catarrhal enterocolitis. General appearance after death, much emaciated. Heart, two hundred and seventy grams, endocardium in left ventricle shows some hemorrhagic foci and sclerosis. Kidneys, left, one hundred and thirty grams; right, one hundred and ten grams; shape normal, somewhat cyanotic in color, very firm, capsule strips with slight difficulty, surface granular, cortex 4 to 7 mm. in thickness. Two kidneys cut into one hundred and fifty sections.

Microscopic study: Twenty specimens in paraffin studied. Kidney investment thickened. Malpighian bodies sometimes closer to investment than normally. Glomeruli congested, vacuolated, one line space between glomerulus and capsule. Bowman's capsule slightly thickened. Convoluted tubules under investment dilated, lumen usually contains granular debris and sometimes a few desquamated necrotic cells, epithelium atrophic, degenerated, and necrotic; toward pyramids the convoluted tubules are not so dilated and contain more desquamated epithelium, otherwise the same. Medullary rays like latter. Cortex not congested; hyaline casts. Interstitial tissue in cortex generally thickened, in focal interstitial areas, especially under investment, markedly so. Blood-vessels quite markedly thickened with occasional thrombi. Typical focal interstitial areas and areas of round-cell infiltration under investment and throughout cortex. In focal interstitial areas Malpighian

hian bodies usually fibroid. Pyramids congested; interstitial tissue markedly increased; hyaline casts. One area in pyramid looks like a healed tubercle. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis apparently starting from the larger blood-vessels.

Case No. A-8335. Philadelphia Hospital. Age, fifty. Male. Black. American. Entered hospital 4-13-'06; died 6-9-'06. Occupation, laborer. Family history, mother died of tumor. Previous diseases, measles, rheumatism. Alcoholism, not recorded. Edema present. Bowels, regular. Urine, acid, 1017, trace of albumin, few granular casts, hyaline casts. Pulse, 80 to 100; respiration, 20 to 30; temperature, 97° to 99°.

Pathological diagnosis, chronic aortitis and endocarditis, ulcerative aortitis, chronic parenchymatous nephritis, congestion of lungs, hydrothorax, hydropericardium, ascites, dilatation of stomach, fatty cirrhosis and congestion of liver, general superficial edema of skin, interstitial pancreatitis and arteriosclerosis, interstitial splenitis. General appearance after death, well nourished. Heart, six hundred and fifty grams, enlarged, cavities dilated. Kidneys, left, one hundred and ninety grams; right, one hundred and ninety grams; enlarged, cortex increased, capsule strips easily, surface smooth. Two kidneys cut into one hundred and sixty sections; one cyst size of pea in cortex.

Microscopic study: Twenty-three specimens in paraffin studied. Kidney investment normal or slightly thickened. Malpighian bodies normally distant from investment. Glomeruli congested, not vacuolated, one line or no space between glomerulus and capsule, space usually empty, though frequently contains what appears like coagulated débris and a few blood-corpuscles. Bowman's capsule thickened. Convolute tubules throughout dilated, lumen contains considerable granular débris and sometimes a few desquamated, necrotic cells, epithelium granular, frequently necrotic. Medullary rays the same except the lumen is practically always filled with desquamated epithelium. Cortex not congested; no hyaline casts. Interstitial tissue in cortex quite markedly thickened, especially in focal interstitial areas. Blood-vessels not thickened. Some rather typical focal interstitial areas scattered throughout cortex and pyramids. Diagnosis, chronic general interstitial nephritis, slight chronic focal interstitial nephritis.

Case No. A-8368. Philadelphia Hospital. Age, thirty. Male. White. Married. Irish. Entered hospital 5-20-'06; died 6-11-'06. Occupation, waiter. Family history, negative. Previous diseases, measles, whooping-cough, mumps, diphtheria, scarlet fever, typhoid fever, rheumatism. Patient alcoholic. No edema. Bowels, constipated. Urine, alkaline, 1020, no sugar,

no albumin, triple phosphates, amorphous urates. Pulse, not recorded; respiration, 20 to 40; temperature, 96° to 101°.

Pathological diagnosis, bilateral pleural effusions, edema of lungs, angioma of liver, acute splenic tumor, chronic passive congestion of kidneys, stomach, and intestines, acute vegetative endocarditis, catarrhal cystitis. General appearance after death, well nourished. Heart, five hundred and ten grams, somewhat larger than patient's clenched fist, both sides relaxed. Kidneys, left, one hundred and ninety grams; right, two hundred and fifty grams; firmer than normal, surface does not bulge, cortex normal. Two kidneys cut into one hundred and sixty sections; no cysts.

Microscopic study: Nine specimens in paraffin studied. Kidney investment normal. Malpighian bodies sometimes closer to investment than normally. Glomeruli congested, slightly vacuolated, one line or no space between glomerulus and capsule, space sometimes contains a few red blood-corpuscles. Bowman's capsule thickened. A rare Malpighian body fibroid. Convoluted tubules everywhere slightly dilated, lumen filled with granular debris and sometimes desquamated epithelium, epithelium atrophic, disintegrated, and sometimes necrotic. Medullary rays the same. Cortex not congested; no hyaline casts. Interstitial tissue in cortex thickened. Blood-vessels normal. A few focal interstitial areas under investment and throughout cortex. Pyramids congested; interstitial tissue increased; no casts. Diagnosis, chronic general interstitial nephritis, slight chronic focal interstitial nephritis.

Case No. A-8581. Philadelphia Hospital. Age, sixty-six. Male. White. Widower. American. Entered hospital 7-3-'06; died 7-8-'06. Occupation, not recorded. Family history, negative. Previous diseases, typhoid, measles, scarlet fever. Patient alcoholic. Edema present. Bowels, subject to diarrhea. Urine, acid, 1012, albumin present, no sugar, red blood-cells, epithelial cells, amorphous debris. Pulse, 50 to 110; respiration, 16 to 40; temperature, 96° to 99°.

Pathological diagnosis, hypertrophy of left ventricle, fibroid myocarditis, healed tuberculosis of left apex, chronic adhesive pleurisy of left side, chronic interstitial nephritis, red atrophy of liver. General appearance after death, fairly well nourished. Heart, five hundred and sixty grams, milk spot over apex, left ventricle contains small amount of clotted blood. Kidneys, left, one hundred and forty grams, right, one hundred and fifty grams; capsule slightly adherent, surface granular and a few cysts beneath capsule, cut surface shows narrowing of cortex at many points. Two kidneys cut into one hundred and sixty sections.

Microscopic study: Twelve specimens in paraffin studied. Kidney in-

vestment thickened. Glomeruli congested, not vacuolated, one line or no space between glomerulus and capsule, space usually empty, sometimes contains a few red blood-corpuscles. Bowman's capsule thickened. Convoluted tubules under investment and near pyramids dilated, lumen contains granular debris, epithelium slightly atrophic and degenerated; between these two limits the convoluted tubules are about normal in size, lumen contains granular debris, epithelium swollen, granular, and sometimes necrotic. Medullary rays like convoluted tubules near pyramids. Cortex not congested; hyaline casts. Interstitial tissue in cortex generally thickened, in focal interstitial areas quite markedly so. Blood-vessels show endarteritis. Typical focal interstitial areas and areas of round-cell infiltration under investment and throughout cortex. Pyramids congested; interstitial tissue increased; hyaline casts. Several microscopic cysts. One area in cortex looking like young tubercle without caseation or giant cells. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis.

Case No. A-8779. Philadelphia Hospital. Age, thirty-four. Male. White. Married. American. Entered hospital 7-24-'06; died 7-31-'06. Occupation, machinist. Family history, negative. No previous diseases. No alcoholism. No edema. Bowels, regular. Urine, acid, 1018, no albumin, leucocytes, red blood-cells, crystals, epithelial cells. Pulse, 90 to 150; respiration, 30 to 60; temperature, 100° to 104°.

Pathological diagnosis, congestion and beginning bronchopneumonia of lungs, acute parenchymatous nephritis, cloudy swelling of liver, typhoid ulcers of ileum and cæcum. General appearance after death, somewhat emaciated. Heart, two hundred and seventy grams, muscle pale but firm, mitral valve shows some slight fibrous thickening of leaflet, otherwise valves are normal. Kidneys, left, two hundred and thirty grams; right, two hundred and forty grams; soft, capsule strips easily, surface smooth. Two kidneys cut into one hundred and sixty sections.

Microscopic study: Thirteen specimens in paraffin studied. Kidney investment normal or slightly thickened. Malpighian bodies somewhat closer to investment than normally. Glomeruli not congested, not vacuolated, one line or no space between glomerulus and capsule, space sometimes contains red blood-corpuscles. Bowman's capsule normal or sometimes thickened. Convoluted tubules everywhere slightly dilated, lumen contains granular debris and desquamated necrotic epithelium, epithelium granular, degenerated, and sometimes necrotic. Medullary rays the same. Cortex not congested; few hyaline casts. Interstitial tissue in cortex generally thickened, in focal interstitial areas markedly so. Blood-vessels normal. Typical focal inter-

stitial areas and areas of round-cell infiltration under investment and throughout cortex. Pyramids not congested; interstitial tissue increased; no hyaline casts. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis.

Case No. 840. Pennsylvania Hospital. Age, twenty. Male. White. Single. American. Entered hospital, not recorded; died 3—13—'06. Occupation, clerk. Family and personal history, not recorded.

Pathological diagnosis, typhoid fever, hyperplasia, necrosis and ulceration of Peyer's patches and solitary follicles in the ileum and colon, hemorrhage into the colon, swelling of mesenteric lymph nodes, cloudy swelling and fatty degeneration of liver, cloudy swelling and congestion of kidneys; fatty degeneration of myocardium, congestion of lungs, fatty degeneration of the intima of the aorta and of the right coronary artery. General appearance after death, not recorded. Heart, normal. Kidneys, weigh together, four hundred and fifty grams, capsule strips easily and freely, outer surface is smooth, of a finely mottled reddish-brown color, and shows a few irregular, persistent, fetal lobulations, the cut section is yellowish red and cloudy throughout, medullary pyramids are irregular, collecting tubules are regular, the cortex is 9 mm. in thickness, its tubules are indistinct but regular, glomeruli are distinct and congested, there is a cyst 1 cm. in diameter in cortex at one pole of the kidney and another 4 mm. in diameter at the other pole. Two kidneys cut into one hundred and sixty sections; one suspicious speck in cortex; one cyst size of bean between cortex and medulla, several (three or four) very small pin-point to pin-head cysts in cortex.

Microscopic study: Nineteen specimens in paraffin studied. Kidney investment normal or slightly thickened. Malpighian bodies normally distant from investment. Glomeruli congested, occasionally vacuolated, one line or no space between glomerulus and capsule. Bowman's capsule thickened, and not infrequently shows some proliferation of the epithelium. Convoluted tubules usually somewhat dilated, near the surface usually empty or contain a small amount of granular material; toward the pyramids filled with desquamated necrotic epithelium, epithelium everywhere somewhat atrophic, markedly degenerated and necrotic. Medullary rays same as latter convoluted tubules; a few hyaline casts. Interstitial tissue in cortex slightly thickened. Blood-vessels normal. No focal interstitial areas or areas of round-cell infiltration. Pyramids congested; interstitial tissue slightly increased; a few hyaline casts. One small indentation in investment with beneath a little more degeneration of epithelium of the tubules and thickening of interstitial tissue, but not a typical focal interstitial area. Another small

indentation showing practically nothing beneath except a microscopic cyst. The suspicious speck was a small lipoma in cortex. Diagnosis, chronic parenchymatous nephritis.

Private case. Age, eighteen. Female. White. Single. American. Started treatment, 11—11—'04; died 9—15—'05. Occupation, not recorded. Family history, mother died of tuberculosis. Previous diseases, measles, pertussis, scarlatina, diphtheria. No alcoholism. No edema. Bowels, regular. Urine, not recorded.

Pathological diagnosis, bronchopneumonia, pyæmic abscesses of kidney, mitral sclerosis, hypertrophy of heart. General appearance after death, well nourished. Heart, hypertrophy and mitral sclerosis. Kidneys, one kidney much larger than other, many small infarcts and many pyæmic abscesses, many scars on surface. Two kidneys cut into one hundred and sixty sections.

Microscopic study: Twenty specimens in paraffin studied. Kidney investment slightly thickened. Malpighian bodies normally distant from investment. Glomeruli not congested, not vacuolated, many hyaline, one line space between glomerulus and capsule. Bowman's capsule thickened. Convoluted tubules under investment somewhat shriveled, lumen usually contains hyaline casts, epithelium atrophic. In the cortex generally there are so many small abscesses that the condition of the convoluted tubules cannot be accurately stated. As a rule, they appear like the convoluted tubules under investment—somewhat shriveled, epithelium atrophic and the lumen usually contains casts. In areas in which the interstitial tissue is decidedly thickened the convoluted tubules show almost no lumen, the epithelium is swollen, cloudy, and degenerated. Medullary rays not found. Cortex congested; hyaline casts. Interstitial tissue in cortex thickened. Blood-vessels thickened. Several focal interstitial areas under investment and throughout cortex. Pyramids congested; interstitial tissue increased; hyaline casts. Scattered through cortex pyæmic abscesses varying in size from 0.5 to about 3 or 4 mm. in diameter. These abscesses show nothing peculiar. Diagnosis, chronic general interstitial nephritis, slight chronic focal interstitial nephritis, pyæmic abscesses.

Private case. Age, forty-four. Female. Black. American. Died 8—21—'06. Occupation, housework. Urine, 7—16—'06, large quantity of albumin, no casts, no sugar.

Pathological diagnosis, hypertrophy and dilatation of heart, large right-sided hydrothorax, slight degree of ascites, small red kidneys (congested and contracted kidneys), congestion of lungs, no tubercles. Heart, hypertrophy

and dilatation. Kidneys, two kidneys cut into one hundred and sixty sections, five or six small yellowish areas especially in pyramids.

Microscopic study: Thirty specimens in paraffin studied. Kidney investment thickened. Malpighian bodies closer to investment than normally. Glomeruli congested, vacuolated, two lines space between glomerulus and capsule. Bowman's capsule thickened. Convoluted tubules everywhere dilated, lumen contains granular debris, epithelium atrophic and sometimes necrotic. Medullary rays the same. Cortex not congested; hyaline casts. Interstitial tissue in cortex generally thickened, in focal interstitial areas markedly thickened. Blood-vessels thickened and organized thrombi quite frequent. Typical focal interstitial areas and areas of round-cell infiltration under investment and throughout cortex. Malpighian bodies in focal interstitial areas sometimes fibroid. Pyramids congested; interstitial tissue increased; hyaline casts. The small macroscopic areas in pyramids are thickened connective tissue. Diagnosis, chronic general interstitial nephritis, chronic focal interstitial nephritis apparently starting from the larger blood-vessels.

Private case. Age, ninety-nine. Female. Black. American. Died 6—21—'06. Occupation, housework. Family history, not recorded. Previous diseases, not recorded. Patient alcoholic. Edema present. Bowels, not recorded. Urine showed albumin, many leucocytes.

Pathological diagnosis, very extensive general arteriosclerosis, especially of aorta, pyonephrosis (right kidney), chronic interstitial nephritis (left kidney), "Schnürleber," chronic passive congestion and interstitial inflammation of liver, old scar tissue at apices of both lungs, bilateral chronic adhesive pleuritis, empyema of gall-bladder, atrophy of spleen, fibrous inflammation of left adrenal. Kidneys, small, evidently contracted. Many small cysts from size of pea down, many small pyæmic abscesses. One and one-quarter kidneys cut into one hundred and twenty sections.

Microscopic study: Eleven specimens in paraffin studied. Kidney investment thickened. Malpighian bodies rarely closer to investment than normally. Glomeruli congested, not vacuolated, one line space between glomerulus and capsule. Bowman's capsule normal or slightly thickened. Convoluted tubules under investment dilated, epithelium atrophic, granular, frequently necrotic, lumen usually contains granular debris; toward pyramids tubules more shriveled in appearance, epithelium slightly more atrophic but less degenerated, the tubules here frequently contain hyaline casts. Medullary rays like tubules near pyramids. Interstitial tissue in cortex generally normal, here and there more or less thickened, especially about blood-vessels and in their vicinity. Blood-vessels show endarteritis. Pyramids congested; inter-

stitial tissue markedly increased. Moreover, the number of tubules in the pyramids appears less. Small abscesses are found scattered everywhere through cortex and pyramids. It is to be noticed that despite the fact that the kidneys were very small and appeared macroscopically evidently contracted, there is comparatively little increase in the connective tissue of the cortex. In other words, the macroscopic appearance of the kidneys, even with advanced age (ninety-nine), adds nothing to the microscopic diagnosis. Except for the recent pyæmic abscesses and the consequent acute degeneration of the epithelium in some of the tubules, the kidneys appear to be the perfectly normal kidneys of an old person beginning to manifest a certain amount of arteriosclerosis of the larger vessels. Diagnosis, pyæmic abscesses, slight arteriosclerotic kidneys.

Conclusions in regard to the kidneys in cases of tuberculosis of the lungs:

Pathological.—1. A comparison of one hundred and one kidneys from cases of tuberculosis of the lungs with forty-four kidneys from a variety of other conditions shows apparently nothing outside of tubercles that can be said to be specific to the tuberculosis.

2. Every form of nephritis was found except hemorrhagic nephritis and glomerulonephritis.

3. The most common form of nephritis found in cases of tuberculosis of the lungs is chronic focal interstitial nephritis (77%). This nephritis is not confined to cases of tuberculosis, but is also found in association with other conditions. It appears to be the result of a local infection, and in cases of tuberculosis may possibly be due to the tubercle bacillus.

4. Chronic general interstitial nephritis is not only uncommon in association with tuberculosis of the lungs, but it would seem that tuberculosis was antagonistic to its development.

5. Chronic parenchymatous nephritis (usually of mild grade) was found in 34% of cases of tuberculosis, but whether or not it is dependent on the tuberculosis cannot be said. It is natural to suppose, however, that the long-continued action of a toxin such as would be produced in tuberculosis might be the cause.

6. Positive tubercles were found in the kidneys in 43% of cases.

7. Except in extreme cases the weight of the kidneys, whether the capsule strips easily or with difficulty, whether the surface is smooth or granular, the consistency increased or decreased, or the cortex broader or narrower, adds nothing to the diagnosis of the pathological condition; in other words, except in extreme cases it is impossible to make a diagnosis from the macroscopic appearance.

Clinical.—1. Inoculation experiments showed tubercle bacilli in the urine in 82.5% of the urines inoculated (seventeen cases).

2. Tubercle bacilli were found in the urine on microscopic examination in 75% of cases examined (twelve cases).

3. Sometimes the bacilli found in urine, even in cases showing tubercles in the kidneys, do not affect guinea-pigs.

4. Sometimes bacilli are found in the urine capable of infecting guinea-pigs without tubercles being found in the kidneys.

5. Edema was found in 37% of cases. It was most frequent in association with acute parenchymatous nephritis.

6. Albumin was found to the heat and acetic acid test in 51% of cases. It was found most commonly in connection with acute parenchymatous nephritis.

7. Casts and pus cells apparently depend on the carefulness of the observer, varying in my studies from 25% to 66%.

8. The heart was commonly normal both clinically and pathologically; when abnormal, no relation was found between the heart and the kidney condition.

9. The nephritis accompanying tuberculosis may be surmised but cannot be assured; with the possible exception of amyloid, the kind of nephritis cannot be even surmised.

10. The most common clinical symptoms of nephritis in tuberculosis, according to my personal studies, are hyaline and granular casts in the urine. Less frequent symptoms are slight traces of albumin in the urine and edema.

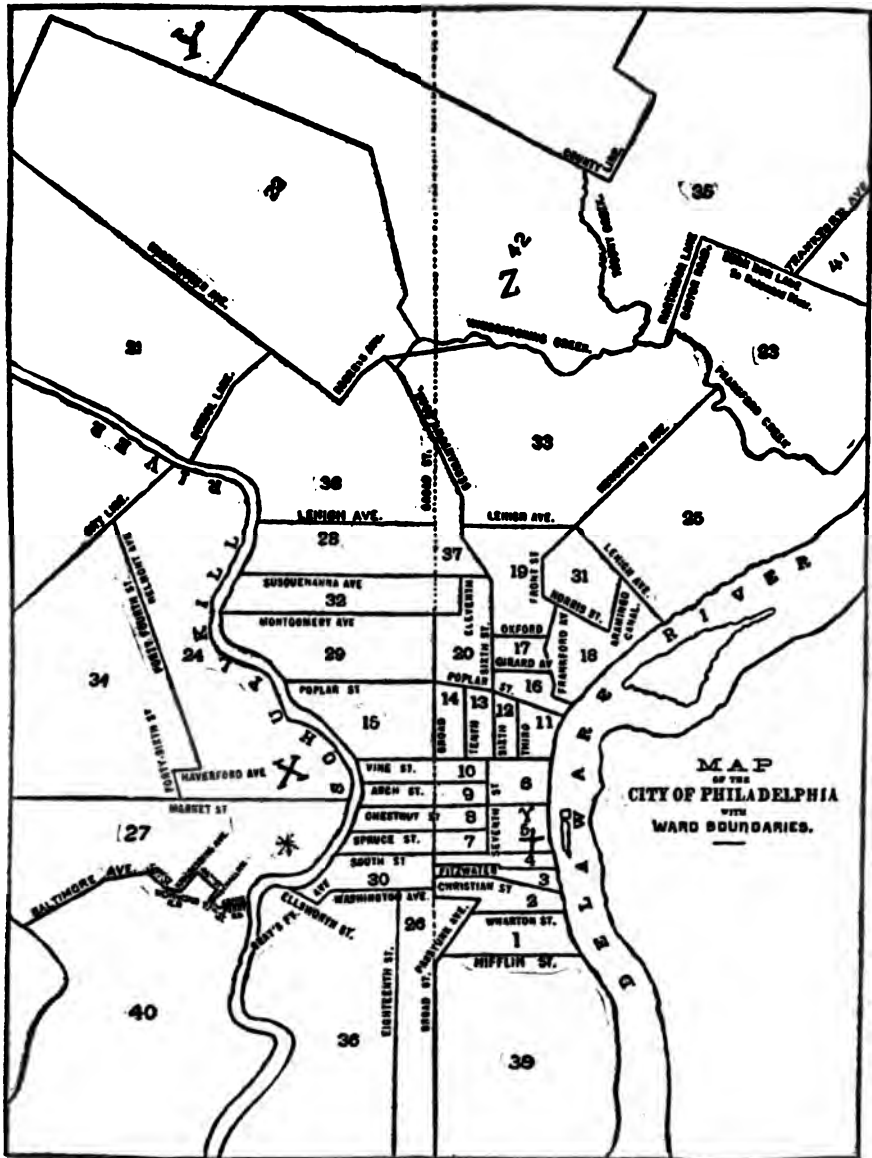
JOSEPH WALSH.

A STATISTICAL STUDY
OF THE
INFLUENCE OF THE HENRY PHIPPS INSTITUTE
UPON THE DEATH-RATE FROM TUBER-
CULOSIS IN PHILADELPHIA.

The Henry Phipps Institute has been established for the study, treatment, and prevention of tuberculosis. Prevention is one of its main objects. The Institute has been in operation three years, and while three years is a very short time in which to measure the preventive influence of a work in so large a field as that of tuberculosis, that influence ought to begin to reveal itself even in three years if it really exists.

We present a map of Philadelphia, giving the outlines of the wards, and some tables which show the reduction in the death-rate from tuberculosis topographically and chronologically during the three years during which the Institute has carried on its work. With these it is possible in a measure to determine the relationship between the work of the Institute and the change in the death-rate from tuberculosis in the city. We do not claim, of course, that all of the change in the death-rate has been due to the Institute, but we believe that the influence of the Institute can be seen in this reduction.

The map of the city here presented gives an outline of the wards. The location of the Institute is indicated by a cross. The location of the Philadelphia Hospital, which has wards for tuberculous patients with upwards of two hundred beds, is in-



icated by a star. The location of the Rush Hospital for Diseases of the Chest, which has thirty-six beds for consumptives, is indicated by the letter X. The location of the Chestnut Hill Home for Consumptives, which has fifty-one beds for females, just outside of the city limits, is indicated by the letter Y. The location of the Jewish Hospital, which has a tuberculosis department with forty beds, is indicated by the letter Z. The location of the House of Mercy, which is part of the Chestnut Hill Home for Consumptives, and has twelve beds for males, is also indicated by the letter Y. The tuberculosis department of the Philadelphia Hospital, the Rush Hospital, the Chestnut Hill Home for Consumptives, the Jewish Hospital, and the House of Mercy were in existence prior to the time when the Henry Phipps Institute was established. The preventive influence of these institutions has, however, undoubtedly been increased during the last few years.

The locations of the institutions which are doing tuberculosis work have been indicated on the map for another reason besides that of helping to determine the preventive influence of the institutions. In Philadelphia unfortunately deaths are sometimes returned from institutions in which people die and such deaths are registered from the wards in which such institutions are located. It is manifestly impossible under these circumstances to make an accurate topographical study of the mortality from any disease. As will be seen by the tables which we publish, the mortality from tuberculosis in the fifth ward, in which the Phipps Institute is located, nearly doubled during the first year of the Institute's work. The Institute draws patients from outside of the city, and even outside of the State. It is practically certain that some of this increase is due to deaths of patients from outside of Philadelphia. An effort has been made to correct errors growing out of inaccurate registration of deaths, but it has not been possible to correct all.

The part of the city lying between Vine Street and South Street, and between the Schuylkill River and the Delaware River,

is old Philadelphia. It is now occupied by the business interests of the city and inhabited by the wealthiest and poorest residents. The fifth, sixth, and tenth wards have within their limits the slums of Philadelphia. The seventh, eighth, and ninth have within their limits the most aristocratic population of Philadelphia. The seventh ward also has the largest colored population of any ward in Philadelphia. The second, third, fourth, fifth, and sixth wards have the largest foreign element; the second, third, and fourth having the largest Italian element, and the fourth, fifth, and sixth the largest Russian Jewish element. The fourth ward has about equal elements of Italians and Jews.

The eleventh, twelfth, thirteenth, sixteenth, seventeenth, eighteenth, nineteenth, twenty-third, twenty-fifth, thirty-first, thirty-third, thirty-sixth, and thirty-seventh wards include the principal manufacturing districts of Philadelphia, but by no means all of them. There are large manufacturing interests in the fourteenth, fifteenth, twentieth, twenty-sixth, twenty-seventh, twenty-eighth, twenty-ninth, thirtieth, thirty-second, thirty-sixth, and thirty-eighth wards. In the fourteenth, fifteenth, twentieth, twenty-sixth, twenty-seventh, twenty-eighth, twenty-ninth, and thirtieth wards a fair number of wealthy people reside. The twenty-first and twenty-second wards are the Chestnut Hill and Germantown districts, and have mostly a well-to-do population, but also some poor people. Part of the thirty-eighth ward belongs to this district. The twenty-fourth, twenty-seventh, thirty-fourth, and fortieth wards largely constitute what is known as the West Philadelphia district, which is mostly inhabited by well-to-do people. The twenty-sixth, twenty-seventh, thirty-fourth, thirty-fifth, thirty-sixth, thirty-ninth, fortieth, forty-first, and forty-second wards are on the outlying border of the city and are rapidly growing. Some of these wards have the unsanitary conditions which go with newly made ground and incomplete city improvements to contend with. In no part of Philadelphia is there an exclusive population.

TABLE I.
DEATHS FROM TUBERCULOSIS OF THE LUNGS IN THE WARDS OF
PHILADELPHIA IN RELATION TO CASES TREATED
BY THE HENRY PHIPPS INSTITUTE.

WARD.	YEAR.	WARD POPULATION.	TREATED IN DISPENSARY.	TREATED IN HOSPITAL.	TREATED IN BOTH DISPENSARY AND HOSPITAL.	DEATHS IN WARD.	DEATHS PER 1000 POPULATION.	WARD.	YEAR.	WARD POPULATION.	TREATED IN DISPENSARY.	TREATED IN HOSPITAL.	TREATED IN BOTH DISPENSARY AND HOSPITAL.	DEATHS IN WARD.	DEATHS PER 1000 POPULATION.
1	1902	39,976	..	..	..	93	2.326	10	1902	20,197	..	..	..	46	2.277
	1903	41,046	61	5	2	96	2.338		1903	20,310	25	11	5	55	2.708
	1904	42,144	40	3	1	87	2.064		1904	20,418	18	4	0	52	2.546
	1905	43,202	45	3	1	69	1.597		1905	20,527	5	4	1	35	1.705
2	1902	35,960	..	..	..	65	1.807	11	1902	11,970	..	..	..	26	2.172
	1903	36,345	75	6	4	65	1.788		1903	12,044	16	0	0	28	2.324
	1904	36,734	35	9	3	60	1.633		1904	12,108	6	1	0	27	2.220
	1905	37,127	30	2	1	56	1.508		1905	12,172	11	2	2	18	1.478
3	1902	25,221	..	..	..	39	1.546	12	1902	14,009	..	..	..	38	2.712
	1903	25,401	62	5	2	55	2.157		1903	14,094	20	3	1	35	2.483
	1904	25,764	54	7	4	66	2.561		1904	14,169	10	1	0	25	1.764
	1905	26,039	31	2	0	45	1.728		1905	14,244	6	2	0	24	1.684
4	1902	23,045	..	..	..	42	1.822	13	1902	17,624	..	..	..	49	2.780
	1903	23,291	87	6	5	42	1.803		1903	17,729	29	4	5	34	1.917
	1904	23,540	76	8	5	37	1.571		1904	17,823	14	8	1	29	1.627
	1905	23,792	50	3	2	28	1.176		1905	17,918	10	2	0	42	2.344
5	1902	17,229	..	..	..	35	2.031	14	1902	19,623	..	..	..	36	1.834
	1903	17,413	97	10	6	59	3.388		1903	19,738	24	3	3	41	2.077
	1904	17,599	82	5	3	56	3.181		1904	19,843	16	4	0	43	2.166
	1905	17,787	58	5	5	42	2.361		1905	19,950	8	3	0	50	2.506
6	1902	8,128	..	..	..	25	3.075	15	1902	53,087	..	..	..	120	2.264
	1903	8,171	25	4	3	16	1.958		1903	54,519	39	9	3	109	1.999
	1904	8,216	21	3	3	13	1.582		1904	55,978	22	9	3	130	2.322
	1905	8,259	14	1	1	4	.484		1905	57,476	12	4	0	101	1.757
7	1902	28,438	..	..	..	76	2.672	16	1902	16,137	..	..	..	30	1.859
	1903	28,590	59	13	8	102	3.567		1903	16,319	18	2	2	37	2.267
	1904	28,742	31	7	3	87	3.026		1904	16,493	5	1	0	42	2.545
	1905	28,895	27	4	0	89	3.080		1905	16,669	11	2	1	33	1.979
8	1902	15,936	..	..	..	18	1.129	17	1902	18,302	..	..	..	34	1.857
	1903	16,117	16	3	1	36	2.233		1903	18,509	27	7	3	36	1.945
	1904	16,203	11	0	0	31	1.913		1904	18,707	9	2	2	38	2.031
	1905	16,289	6	1	0	23	1.411		1905	18,907	15	2	1	34	1.798
9	1902	7,038	..	..	..	11	1.562	18	1902	30,288	..	..	..	72	2.377
	1903	7,086	10	5	3	10	1.411		1903	30,623	27	3	1	67	2.187
	1904	7,123	7	0	0	15	2.105		1904	30,950	5	2	1	59	1.906
	1905	7,161	3	1	0	19	2.653		1905	30,983	7	2	2	53	1.710

TABLE I.—(Continued.)

WARD.	YEAR.	WARD POPULATION.	TREATED IN DISPENSARY.	TREATED IN HOSPITAL.	TREATED IN BOTH DISPENSARY AND HOSPITAL.	DEATHS IN WARD.	DEATHS PER 1000 POPULATION.	WARD.	YEAR.	WARD POPULATION.	TREATED IN DISPENSARY.	TREATED IN HOSPITAL.	TREATED IN BOTH DISPENSARY AND HOSPITAL.	DEATHS IN WARD.	DEATHS PER 1000 POPULATION.
19	1902	58,214	..	..	..	101	1.734	28	1902	45,394	..	..	..	62	1.365
	1903	59,783	47	5	4	104	1.739		1903	46,620	26	1	1	69	1.480
	1904	61,383	33	10	4	112	1.824		1904	47,867	17	3	0	73	1.525
	1905	63,026	17	6	3	114	1.808		1905	49,148	9	3	3	54	1.098
20	1902	44,214	..	..	..	78	1.764	29	1902	63,324	..	..	..	132	2.084
	1903	44,698	39	6	4	93	2.080		1903	65,030	49	9	6	105	1.614
	1904	45,176	8	2	1	102	2.257		1904	66,770	26	2	1	106	1.589
	1905	45,059	9	7	0	61	1.335		1905	68,557	11	4	0	115	1.677
21	1902	33,901	..	..	..	43	1.268	30	1902	30,430	..	..	..	90	2.957
	1903	34,808	16	8	4	44	1.264		1903	31,255	42	7	6	84	2.687
	1904	35,180	7	1	0	52	1.478		1904	32,091	11	3	1	62	1.932
	1905	35,556	1	1	0	36	1.012		1905	32,950	22	5	4	70	2.124
22	1902	55,152	..	..	..	94	1.704	31	1902	33,859	..	..	..	77	2.274
	1903	57,219	23	6	2	102	1.782		1903	34,232	25	2	2	67	1.969
	1904	59,363	16	7	1	104	1.751		1904	34,598	26	9	5	76	2.225
	1905	61,587	7	3	2	94	1.526		1905	34,968	21	1	1	58	1.658
23	1902	27,517	..	..	..	23	.838	32	1902	42,035	..	..	..	51	1.213
	1903	28,264	11	4	2	47	1.662		1903	43,071	23	3	2	58	1.346
	1904	29,323	5	2	0	53	1.806		1904	44,224	12	4	1	55	1.243
	1905	30,422	4	1	0	41	1.347		1905	45,407	7	1	0	45	.991
24	1902	57,008	..	..	..	97	1.701	33	1902	70,283	..	..	..	101	1.436
	1903	59,155	14	4	2	119	2.011		1903	72,928	46	6	5	128	1.755
	1904	61,372	12	3	2	120	2.101		1904	75,661	51	9	4	148	1.956
	1905	63,671	14	4	2	101	1.586		1905	39,470*	35	9	6	99	1.482
25	1902	55,611	..	..	..	92	1.654	34	1902	46,993	..	..	..	93	1.979
	1903	57,706	46	8	4	102	1.767		1903	51,765	22	2	0	80	1.545
	1904	59,868	28	3	1	81	1.353		1904	53,705	10	6	1	106	1.973
	1905	62,111	17	2	1	102	1.642		1905	55,717	13	2	0	91	1.633
26	1902	48,068	..	..	..	94	1.955	35	1902	9,270	..	..	..	10	1.078
	1903	49,354	49	14	6	93	1.884		1903	9,628	4	0	0	12	1.246
	1904	49,588	22	5	1	98	1.976		1904	9,988	5	1	1	13	1.301
	1905	50,915	15	7	3	100	1.964		1905	10,362	1	0	0	13	1.254
27	1902	34,629	..	..	..	87†	2.512	36	1902	50,329	..	..	..	88	1.748
	1903	35,937	11	4	2	92†	2.571		1903	52,226	74	13	5	103	1.972
	1904	37,283	20	1	0	100†	2.682		1904	54,183	33	8	2	113	2.085
	1905	38,680	5	2	0	90†	2.327		1905	56,213	30	4	3	126	2.241

* Divided to make forty-third ward.

† Estimated. It has not been possible to definitely separate the deaths in the ward from the deaths in the almshouse.

TABLE I.—(Continued.)

WARD.	YEAR.	WARD POPULATION.	TREATED IN DISPENSARY.	TREATED IN HOSPITAL.	TREATED IN BOTH DISPENSARY AND HOSPITAL.	DEATHS IN WARD.	DEATHS PER 1000 POPULATION.	WARD.	YEAR.	WARD POPULATION.	TREATED IN DISPENSARY.	TREATED IN HOSPITAL.	TREATED IN BOTH DISPENSARY AND HOSPITAL.	DEATHS IN WARD.	DEATHS PER 1000 POPULATION.
37	1902	22,936	..	..	..	31	1.352	41	1902	11,581	..	..	..	21	1.813
	1903	23,192	14	0	0	30	1.293		1903	11,716	0	0	0	29	2.475
	1904	23,440	4	3	1	31	1.322		1904	11,841	0	0	0	23	1.942
	1905	23,691	1	0	0	41	1.730		1905	11,967	0	0	0	25	2.088
38	1902	35,596	..	..	..	33	.927	42	1902	14,271	..	..	..	17	1.191
	1903	36,841	15	2	2	46	1.248		1903	14,653	1	0	0	22	1.501
	1904	38,220	8	5	2	44	1.151		1904	15,044	2	0	0	21	1.395
	1905	39,652	10	1	0	33	.832		1905	15,446	0	0	0	22	1.424
39	1902	43,414	..	..	..	68	1.568	43	1902	..	..	..	..	..	..
	1903	45,062	44	9	4	75	1.664		1903	..	..	..	..	..	..
	1904	46,750	33	3	1	82	1.754		1904	..	..	..	..	..	..
	1905	48,492	26	3	0	91	2.876		1905	39,026	0	0	0	3	.076
40	1902	20,915	..	..	..	28	1.338								
	1903	21,709	9	2	0	31	1.427								
	1904	22,290	7	1	0	32	1.435								
	1905	23,125	12	2	0	39	1.686								

Table I* gives the population, the number of deaths from tuberculosis, and the ratio of deaths from tuberculosis to population for each ward during the year preceding the foundation of the Phipps Institute; and the population, number of patients treated in the dispensary, number of patients treated in the hospital, number of patients treated in both dispensary and hospital, number of deaths from tuberculosis, and ratio of deaths from tuberculosis to population for each ward during the three years during which the Institute has been in operation. The population in this table is computed in accordance with the rule used by the city in computing the population for the years between the census years. It is only approximately correct. According to this rule, a lower increase is allowed for the older central wards

* We wish to acknowledge the valuable assistance given us by Dr. G. W. Atherholt, Chief of the Division of Vital Statistics of Philadelphia.

than for the newer growing wards. In some of the central wards this may be somewhat misleading. In the third, fourth, and fifth wards, in which the foreign population resides, there is probably a greater increase than we have allowed for. In the sixth, eighth, ninth, and tenth wards, where business is encroaching upon the residential quarters, it is possible that there has even been a decrease in the population. In some of the outlying wards the growth of population may have been even more rapid than that which we have allowed for.

A comparison of the number of patients treated by the Phipps Institute in each ward with the population of the ward gives the following groups of ratio of patients treated to population. The percentages are only approximate. Group I, the fifth ward, with about 0.5% of the population treated; group II, the fourth and sixth wards, with about 0.3% of the population treated; group III, the third ward, with about 0.2% of the population treated; group IV, the second, seventh, and thirteenth wards, with about 0.15% of the population treated; group V, the first, tenth, eleventh, twelfth, fourteenth, seventeenth, thirtieth, and thirty-sixth wards, with about 0.1% of the population treated; group VI, the ninth, fifteenth, sixteenth, nineteenth, twenty-sixth, thirty-first, thirty-third, thirty-ninth, and fortieth wards, with about 0.075% of the population treated; group VII, the eighth, eighteenth, twentieth, twenty-fifth, twenty-ninth, thirty-second, and thirty-fourth wards, with about 0.05% of the population treated; group VIII, the twenty-first, twenty-second, twenty-third, twenty-seventh, twenty-eighth, thirty-fifth, thirty-seventh, and thirty-eighth wards, with about 0.033% of the population treated; group IX, the twenty-fourth ward, with about 0.025% of the population treated. The forty-first, forty-second, and forty-third wards have been formed recently, and we have no way of determining with even approximate accuracy how much work we have done in them.

The comparison of the number of patients treated by the Phipps Institute in each ward with the number of deaths from tuberculosis

gives us the following groups of ratio of cases treated to deaths from tuberculosis. Group I, the fourth and sixth wards, with twice as many cases treated as died in the ward, about 200%; group II, the fifth ward, with one and three-quarter times as many cases treated as died in the ward, about 175%; group III, the third ward, with as many cases treated as died in the ward, about 100%; group IV, the second, thirteenth, and seventeenth wards, with about 75%; group V, the first, seventh, ninth, tenth, eleventh, twelfth, fourteenth, thirtieth, thirty-first, thirty-third, thirty-sixth, and thirty-ninth wards, with about 50%; group VI, the eighth, fifteenth, sixteenth, nineteenth, twentieth, twenty-fifth, twenty-eighth, twenty-ninth, thirty-second, thirty-fifth, and fortieth wards, with about 33%; group VII, the eighteenth, twenty-first, twenty-sixth, and thirty-eighth wards, with about 25%; group VIII, the twenty-second, twenty-third, thirty-fourth, and thirty-seventh wards, with about 20%; group IX, the twenty-fourth and twenty-seventh wards, with about 15%.

A comparison of the number of cases treated in the hospital department of the Institute with the number of deaths during the three years gives the following groups of ratio of isolation to deaths from tuberculosis: Group I, the sixth ward, with nearly half as many cases isolated as died, about 46%; group II, the fourth ward, with over one-fourth as many cases isolated as died, about 27%; group III, the fifth ward, with nearly one fourth as many cases isolated as died, about 22%; group IV, the ninth and thirteenth wards, with about 20%; group V, the tenth ward, with about 18%; group VI, the seventeenth and second wards, with about 15%; group VII, the third, seventh, thirtieth, and twenty-sixth wards, with about 12%; group VIII, the twenty-first, thirty-first, fourteenth, nineteenth, thirty-third, thirty-sixth, and thirty-eighth wards with about 10%; group IX, the twelfth, fifteenth, twentieth, and thirty-ninth wards, with about 8%; group X, the first, eighth, eleventh, sixteenth, eighteenth, twenty-second, twenty-third, twenty-fifth, twenty-eighth, twenty-ninth,

and thirty-second wards, with about 6%; and group XI, the twenty-fourth, twenty-seventh, thirty-fourth, thirty-fifth, thirty-seventh, and fortieth wards, with about 4%.

TABLE II.

DEATHS PER 1000 POPULATION IN THE CITY OF PHILADELPHIA, FROM TUBERCULOSIS OF THE LUNGS FOR TEN YEARS.

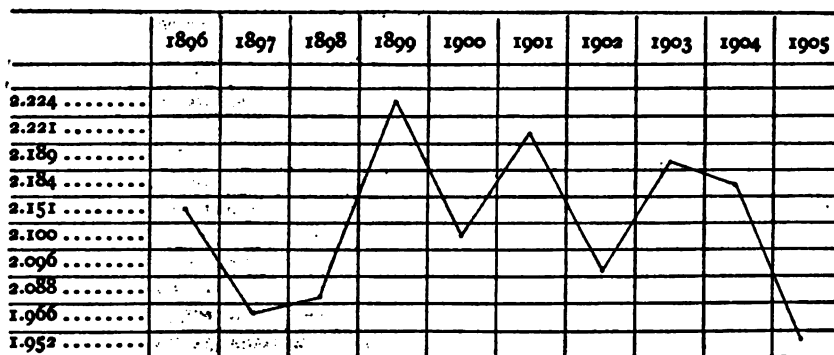


Table II gives the death-rate from tuberculosis for every one thousand of population in the city of Philadelphia during the ten years from 1896 to 1905 inclusive. From 1896 to 1897 there was an abrupt fall; from 1897 to 1898 there was a slight rise; from 1898 to 1899 there was a great rise; from 1899 to 1900 there was a considerable fall; from 1900 to 1901 there was again a rise; from 1901 to 1902 there was again a fall; from 1902 to 1903 there was a rise; from 1903 to 1904 there was a slight fall; and from 1904 to 1905 there was a great fall. As indicated by the table, there is a periodical rise and fall with a constant tendency downward. The periodicity of the rise and fall is what may be termed cyclic, and applies to all diseases and to the death-rate in general. It probably is due in part to the weather conditions; in part to economical conditions; and in part to the weeding out of the weak by epidemics. The tendency upward in 1898 was in a measure due to increase of attention to tuberculosis and more accurate diagnoses. Free sputum examination by the

TABLE III.

SHOWING THE INCREASE AND DECREASE IN TUBERCULOSIS PER
THOUSAND POPULATION IN PHILADELPHIA BETWEEN
1903 AND 1905 INCLUSIVE BY WARDS.

NUMBER OF WARD.	1903.		1904.		1905.		1903 AND 1905 INCLUSIVE.		1904 AND 1905 INCLUSIVE.	
	Incr.	Decr.	Incr.	Decr.	Incr.	Decr.	Incr.	Decr.	Incr.	Decr.
1...	.012	..	..	.274	..	.467	..	.719	..	.741
2...	..	.019	..	.155	..	.125	..	.299	..	.280
3...	.611	..	.404	..	..	.833	.182	..	..	.429
4...	..	.009	..	.232	..	.395	..	.636	..	.627
5...	1.357	..	..	.207	..	.820	.330	..	..	1.027
6...	..	1.117	..	.376	..	1.098	..	2.591	..	1.474
7...	.895	..	..	.541	.054	..	.408	..	..	.487
8...	1.104	..	..	.320	..	.502	.382	..	..	.822
9...	..	.151	.694	..	.548	..	1.091	..	1.242	..
10...	.431	..	..	.162	..	.841	..	.572	..	1.003
11...	.152	..	..	.095	..	.751	..	.694	..	.846
12...	..	.229	..	.719	..	.080	..	1.028	..	.799
13...	..	.863	..	.290	.717	..	..	.436	.427	..
14...	.243	..	.089	..	.340	..	.682	..	.429	..
15...	..	.265	.323	..	..	.565	..	.507	..	.242
16...	.408	..	.278	..	..	.566	.120	..	..	.288
17...	.088	..	.086	..	..	.233	..	.059	..	.147
18...	..	.190	..	.281	..	.196	..	.667	..	.477
19...	.005	..	.085	..	..	.016	.074	..	.069	..
20...	.316	..	.177	..	..	.922	..	.429	..	.745
21...	..	.004	.214	..	..	.466	..	.256	..	.252
22...	.078	..	..	.031	..	.225	..	.178	..	.256
23...	.828	..	.144	..	..	.459	.503	..	..	.315
24...	.310	..	.090	..	..	.515	..	.115	..	.425
25...	.113	..	..	.414	.289	..	..	.012	..	.125
26...	..	.071	.112	..	..	.012	.039	..	.100	..
27...	.059	..	.111	..	..	.355	..	.185	..	.244
28...	.115	..	.045	..	..	.427	..	.267	..	.382
29...	..	.470	..	.025	.088	..	..	.417	.063	..
30...	..	.270	..	.755	.192	..	..	.833	..	.563
31...	..	.305	.256	..	..	.567	..	.616	..	.311
32...	.133	..	..	.103	..	.252	..	.222	..	.355
33...	.319	..	.201	..	..	.474	.036	..	..	.273
34...	..	.434	.428	..	..	.340	..	.346	.088	..
35...	.168	..	.055	..	..	.047	.176	..	.008	..
36...	.224	..	.113	..	.156	..	.493	..	.269	..
37...	..	.141	.029	..	.408	..	.296	..	.437	..
38...	.321	..	..	.097	..	.319	..	.095	..	.222
39...	.096	..	.090	..	1.122	..	1.308	..	1.212	..
40...	.080	..	.008	..	.251	..	.348	..	.259	..
41...	.662	..	..	.533	.146	..	.275	..	..	.387
42...	.310	..	..	.106	.029	..	.233	..	..	.077

city began in Philadelphia in 1896. Many cases of tuberculosis are nowadays diagnosed which formerly were recorded under other names than that of tuberculosis. The rise between 1902 and 1903 may be put down as cyclic. The fall since 1903 was no doubt in part also cyclic, but in part was due to an unusual reduction. It is the most rapid reduction of the ten-year period. In estimating it, moreover, one should keep in mind the concentrated attention which is given to tuberculosis at the present time.

Table III gives the increase and decrease in the death-rate from tuberculosis for every one thousand of population in each ward for the years 1903, 1904, and 1905 separately; the total increase and decrease in each ward for the three years 1903 to 1905 inclusive; and the total increase and decrease in each ward for the two years 1904 and 1905, inclusive. The purpose of presenting the figures for each year separately and for the two periods from 1903 to 1905 and from 1904 to 1905 inclusive is to give a basis of comparison between the work of the Phipps Institute and the changes in the death-rate in different parts of the city. A comparison of Table I with Table III brings out the relationship.

The work of the Institute for preventive purposes must be measured not only by the amount but by the quality. The Institute treats patients in the dispensary and in the hospital. In the dispensary it sends nurses to visit patients in their homes and so tries to bring these patients under control, but the question of poverty and ignorance enters into the problem and sometimes interferes with success. Advanced cases in the most contagious stage of the disease are admitted into the hospital department. By removal into the hospital the source of contagion is abated. The hospital work of the Institute, therefore, while less in quantity than the dispensary work, is better in quality as a preventive agent. In figuring out the influence of the work of the Institute upon the death-rate in the different wards of the city, the number of patients cared for in the hospital should, therefore, be considered as well as the number of patients treated in the dispensary.

The sixth ward has had the greatest reduction in the death-rate from tuberculosis since the Institute was established. For the period between 1903 and 1905 inclusive there was a reduction of 2.591 per thousand, and during the years 1904 and 1905 inclusive there was a reduction of 1.474 per thousand. The ward is in the business section of Philadelphia, and it is very probable that its population has decreased some, but even allowing for error on account of decrease in population this reduction is phenomenal. The Institute has done more preventive work in this ward than in any part of the city. The ward stands in group II in the ratio of patients treated to population, in group I in the ratio of patients treated to deaths from tuberculosis, and in group I in the ratio of patients isolated to deaths from tuberculosis.

The next greatest reduction has been in the fifth ward, where the Henry Phipps Institute is located. During the first year of the Institute's work, namely, 1903, the mortality returns from tuberculosis for the ward increased 1.357 per thousand. Some of this increase probably was due to deaths in the Institute of persons from outside of the city. During the second year, 1904, there was a reduction of 0.207 per thousand, and during the third year, 1905, there was a reduction of 0.820 per thousand, making a total reduction of 1.027 per thousand for the two years. The fifth ward stands in group I in the ratio of patients treated to population, in group II in the ratio of patients treated to deaths from tuberculosis, and in group III in the ratio of patients isolated to deaths from tuberculosis.

The tenth ward stands third in the list of greatest reduction. During 1903 it had a considerable increase, namely, 0.431 per thousand, but during the years 1904 and 1905 it had a decrease of 1.003 per thousand. For the three years it had a net decrease of 0.572 per thousand. It is one of the slum wards of Philadelphia, with an element of shifting population, and business is encroaching on its residential quarters, which makes the computation of its population difficult. It stands in group V in the ratio of

patients treated to population, in group V in the ratio of patients treated to deaths from tuberculosis, and in group V in the ratio of patients isolated to deaths from tuberculosis.

Other wards with very large reductions during the years 1904 and 1905 (above 0.6 per thousand and below 1 per thousand), in the order of sequence from the highest to the lowest, are the eleventh, eighth, twelfth, twentieth, first, and fourth. All of these except the eighth and twelfth stand fairly well in the amount of work done by the Phipps Institute. The fourth stands highest, being in group II in the ratio of patients treated to population, in group I in the ratio of patients treated to deaths from tuberculosis, and in group II in the ratio of patients isolated to deaths from tuberculosis. The first, eleventh, and twelfth wards all stand in group V in the ratio of patients treated to population and in group V in the ratio of patients treated to deaths from tuberculosis. In the ratio of patients isolated to deaths from tuberculosis the first and eleventh wards stand in group X and the twelfth in group IX. The eighth and twentieth wards both stand in group VII in the ratio of patients treated to population, in group VI in the ratio of patients treated to deaths from tuberculosis, and in group IX in the ratio of patients isolated to deaths from tuberculosis. In the eighth ward the population probably has been overestimated.

Wards in which there has been a fair reduction in the death-rate from tuberculosis during the two years 1904 and 1905 (above 0.4 per thousand and below 0.6 per thousand), in the order of sequence from highest to lowest, are the thirtieth, eighteenth, seventh, third, and twenty-fourth. Of these wards, the third, seventh, and thirtieth stand fairly well in work done by the Phipps Institute and the eighteenth and twenty-fourth stand low. The third ward stands in group III in the ratio of patients treated to population, in group III in the ratio of patients treated to deaths from tuberculosis, and in group VII in the ratio of patients isolated to deaths from tuberculosis. The seventh ward stands in group IV in the ratio of patients treated to population, in group V in

the ratio of patients treated to deaths from tuberculosis, and in group VII in the ratio of patients isolated to deaths from tuberculosis. The thirtieth ward stands in group V in the ratio of patients treated to population, in group V in the ratio of patients treated to deaths from tuberculosis, and in group VII in the ratio of patients isolated to deaths from tuberculosis. The eighteenth ward stands in group VII in the ratio of patients treated to population, in group VII in the ratio of patients treated to deaths from tuberculosis, and in group X in the ratio of patients isolated to deaths from tuberculosis. The twenty-fourth ward stands in group IX in ratio of patients treated to population, in group IX in ratio of patients treated to deaths from tuberculosis, and in group XI in the ratio of patients isolated to deaths from tuberculosis. The twenty-fourth ward is one of the lowest in the work of the Institute, but it is the ward in which the Rush Hospital is situated.

The wards in which there has been an increase in the death-rate from tuberculosis during the two years 1904 and 1905 are, in sequence from highest to lowest increase, the ninth, thirty-ninth, thirteenth, thirty-seventh, fourteenth, thirty-sixth, fortieth, twenty-sixth, thirty-fourth, nineteenth, twenty-ninth, and thirty-fifth. In the ninth and thirty-ninth wards there has been about the same increase, over 1.2 per thousand. The ninth ward stands in group VI in ratio of patients treated to population, in group V in ratio of patients treated to deaths from tuberculosis, and in group IV in ratio of patients isolated to deaths from tuberculosis. The thirty-ninth ward stands in group VI in ratio of patients treated to population, in group V in ratio of patients treated to deaths from tuberculosis, and in group IX in ratio of patients isolated to deaths from tuberculosis. The thirteenth, thirty-seventh, and fourteenth wards all had an increase of upwards of 0.4 and below 0.5 per thousand during the two years. The thirteenth ward stands in group IV in ratio of patients treated to population, in group IV in ratio of patients treated to deaths from tuberculosis, and in group IV in ratio of patients isolated to deaths

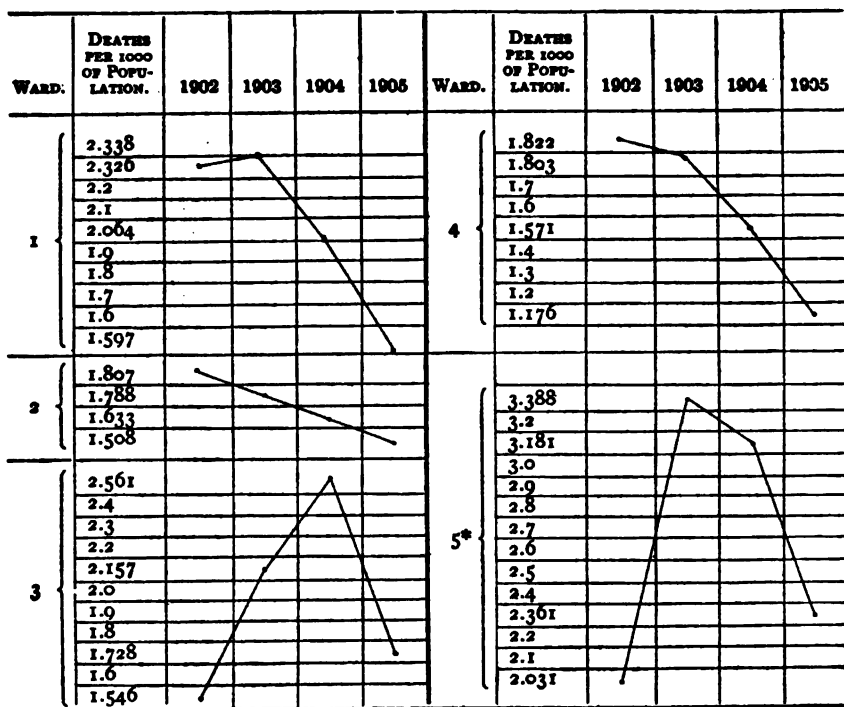
from tuberculosis. The thirty-seventh ward stands in group VIII in ratio of patients treated to population, in group VIII in ratio of patients treated to deaths from tuberculosis, and in group XI in ratio of patients isolated to deaths from tuberculosis. The fourteenth ward stands in group V in ratio of patients treated to population, in group V in ratio of patients treated to deaths from tuberculosis, and in group VIII in ratio of patients isolated to deaths from tuberculosis.

Of the other wards with an increase, the thirty-sixth and fortieth had above 0.2 and below 0.3 per thousand, the twenty-sixth had 0.1 per thousand, and the thirty-fourth, nineteenth, twenty-ninth, and thirty-fifth had less than 0.1 per thousand. The thirty-sixth ward stands in group V in ratio of patients treated to population, in group V in ratio of patients treated to deaths from tuberculosis, and in group VIII in ratio of patients isolated to deaths from tuberculosis. The fortieth ward stands in group VI in ratio of patients treated to population, in group VI in ratio of patients treated to deaths from tuberculosis, and in group XI in ratio of patients isolated to deaths from tuberculosis. The thirty-fourth ward stands in group VII in ratio of patients treated to population, in group VIII in ratio of patients treated to deaths from tuberculosis, and in group XI in ratio of patients isolated to deaths from tuberculosis. The nineteenth ward stands in group VI in ratio of patients treated to population, in group VI in ratio of patients treated to deaths from tuberculosis, and in group VIII in ratio of patients isolated to deaths from tuberculosis. The twenty-ninth ward stands in group VII in ratio of patients treated to population, in group VI in ratio of patients treated to deaths from tuberculosis, and in group X in ratio of patients isolated to deaths from tuberculosis. The thirty-fifth ward stands in group VIII in ratio of patients treated to population, in group VI in ratio of patients treated to deaths from tuberculosis, and in group XI in ratio of patients isolated to deaths from tuberculosis.

None of the wards in which there has been an increase in the

death-rate from tuberculosis for the years 1904 and 1905 stand high in the work done by the Phipps Institute. The highest are the thirteenth and ninth wards, and even these are scarcely up to the average. The ninth ward has the smallest population of any ward in Philadelphia and is undergoing changes both in the way of crowding and encroachment of business upon residential quarters. It is difficult to determine without an actual count whether its population is increasing or decreasing. The thirteenth ward is likewise undergoing changes, probably toward increase.

TABLE IV.



*Dr. Bennett and Miss Yetman, one of the clerks of the Institute, tried to eliminate the errors from the registration of the fifth ward, but found it impossible to do so. For the year 1903 in addition to the errors eliminated there were found: (a) four cases in which no ward was named, but death was put down as having occurred at the Phipps Institute; (b) three cases credited to the fifth ward although address was outside of the ward; (c) twenty-five cases which died at the Phipps Institute for which no ward was given, but address was outside of fifth ward; (d) three cases buried from undertaker in fifth ward and no ward given.—L. F. F.

TABLE IV.—(Continued.)

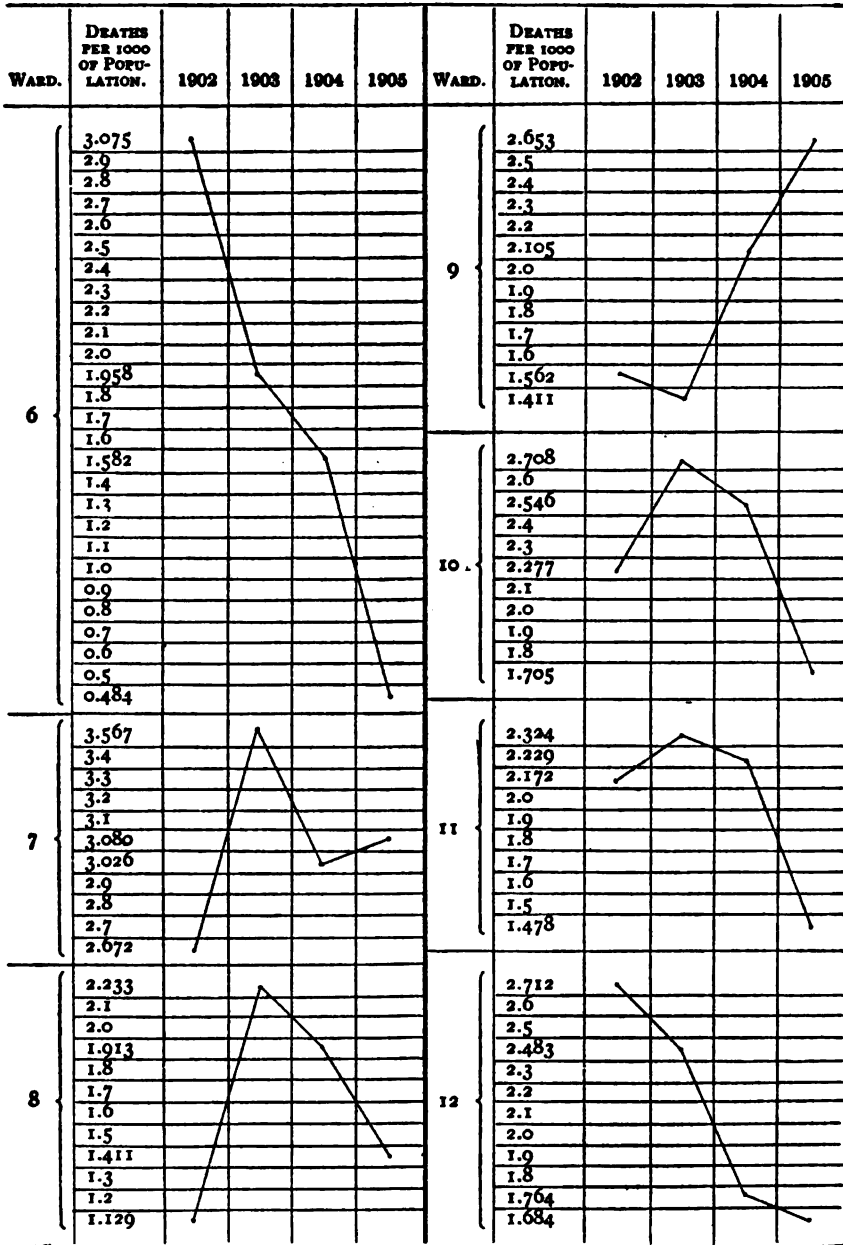


TABLE IV.—(Continued.)

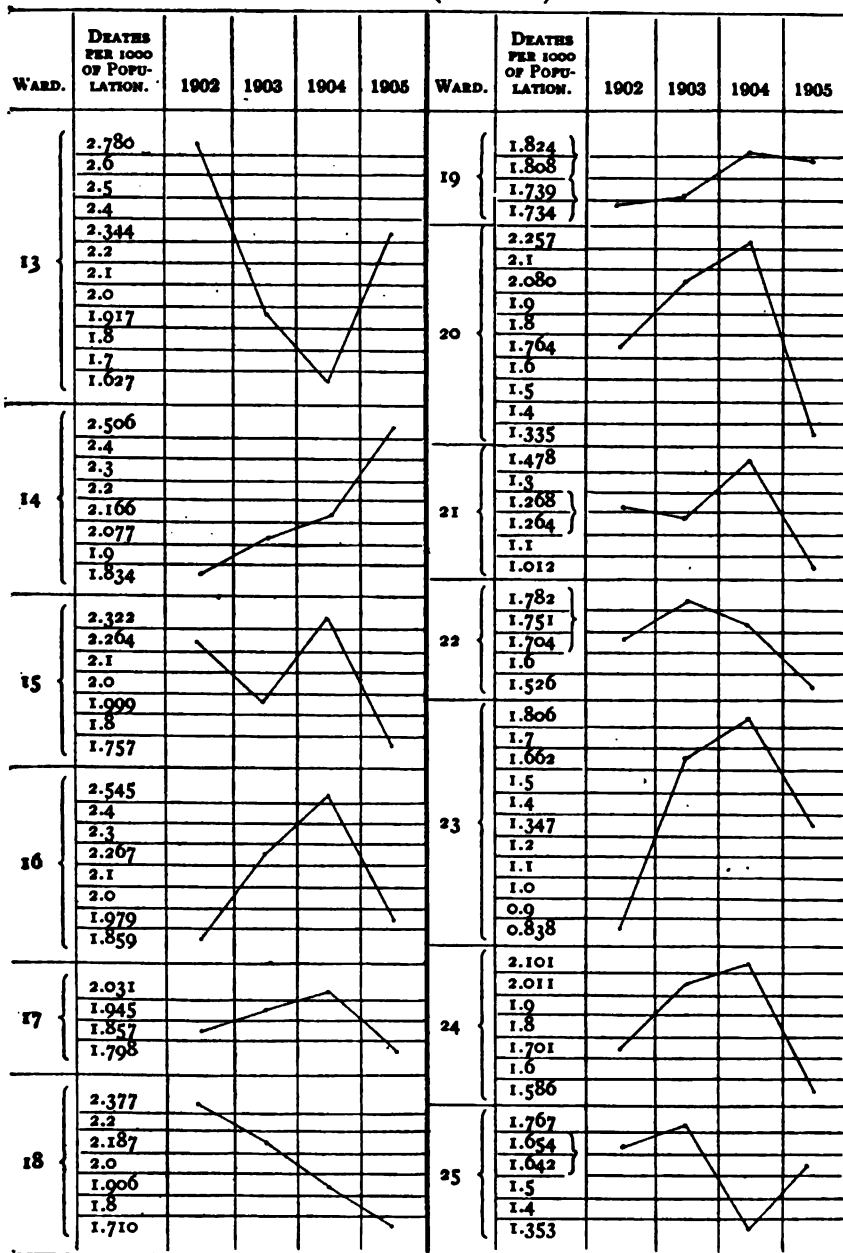


TABLE IV.—(Continued.)

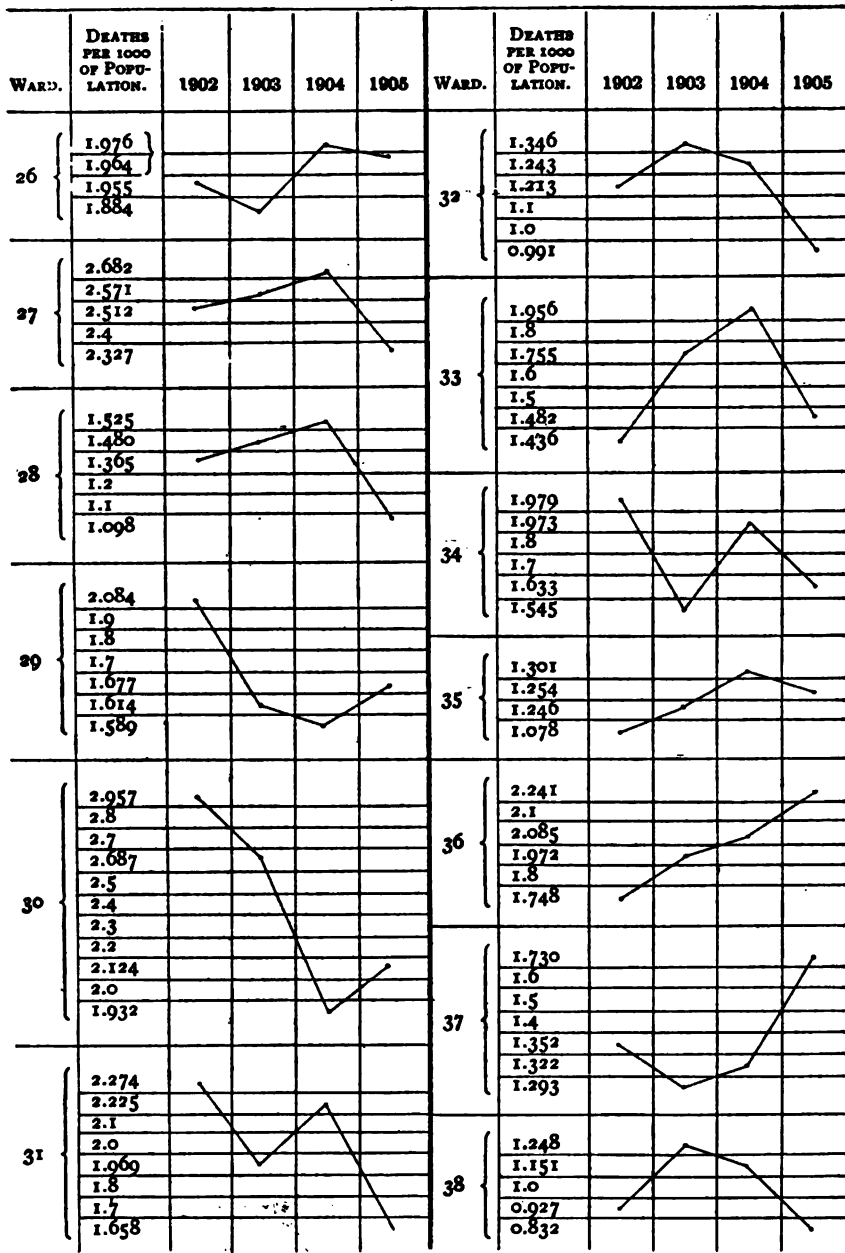


TABLE IV.—(Continued.)

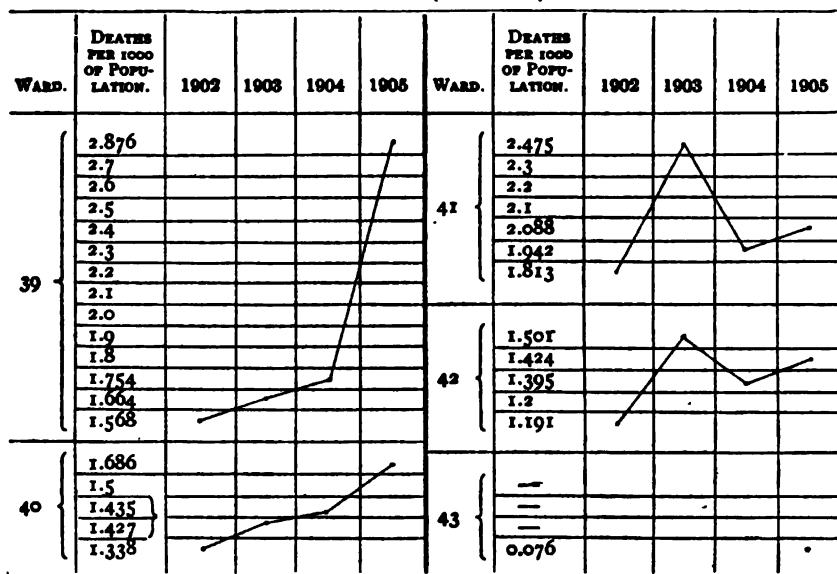


Table IV gives the rise and fall in the death-rate from tuberculosis for each ward during the four years 1902 to 1905 inclusive in graphic form. It is drawn on a scale of 0.1 per thousand for every line.

A most interesting and striking fact which stands out prominently in this topographical study in the death-rate from tuberculosis in Philadelphia is that every ward in which an institution for the treatment of tuberculosis exists has had a reduction in the death-rate from tuberculosis, while some of the adjoining wards have had an increase. This is especially interesting in view of the opposition which exists to the establishment of institutions for the treatment of tuberculosis on the score of danger to the neighborhood. The location of the Rush Hospital in the twenty-fourth ward has been strongly opposed in that ward. One of the arguments most frequently used against its locating there is the menace to residents from contagion. The twenty-fourth ward has a reduction in the death-rate from tuberculosis, while its

neighbor, the thirty-fourth ward, with exactly the same kind of population, has had an increase. In fact, the only West Philadelphia wards which have had a reduction in the death-rate from tuberculosis during the two years are the two which have institutions for the treatment of tuberculosis. In the Chestnut Hill and Germantown district there has been a reduction in all of the wards. In addition to the work done by the Phipps Institute in this region, there has been the influence of the Chestnut Hill Home for Consumptives and the influence of the Lucien Moss Home. The Chestnut Hill Home for Consumptives is just outside of the twenty-second ward in Montgomery County, and the Lucien Moss Home is in the forty-second ward.

Another very interesting fact is that the reduction in the death-rate from tuberculosis during the three years is among the poor in the crowded parts of Philadelphia rather than among the well-to-do in the sparsely built up parts of the city. The greatest reduction has been in the slum district, the foreign district, the colored district, and the manufacturing districts. These are just the parts of Philadelphia in which tuberculosis was most rife formerly. The wards in which the wealthy and the well-to-do live either have had an increase in tuberculosis or very little decrease. A corollary springs from these facts that the superficial instruction given to the wealthy and well-to-do for the prevention of tuberculosis as advocated by many is insufficient for the prevention of tuberculosis.

It will be noted on careful comparison of the tables that in a general way reduction in the death-rate centers somewhat around the location of the Institute. In other words, proximity to the Institute seems to have an influence. This probably is due to the distribution of material aid. The nearer the Institute, the easier it is to give aid. In outlying districts it has been found impracticable to give milk, and the giving of milk seems to play an important rôle in the prevention of tuberculosis. We have a milk depot at the Institute to which patients come every morning

for milk. Since 1904 we have had a milk depot in the thirty-third ward to which people go for milk. Before that time we distributed milk in that part of Philadelphia through a milkman. In West Philadelphia we have distributed milk through a milkman from the beginning. All patients get printed rules when they first come for treatment, and sputum cups, paper napkins, and paper bags every time they come to the dispensary. All patients within the city are visited at intervals by a nurse and instructed in preventive measures. Quite naturally, those who live nearest the Institute get most material aid and attention.

The reason why the giving of material aid has much to do with the prevention of tuberculosis is because control of the patient depends somewhat upon the supply of material aid. Patients who do not get aid are less likely to continue their visits to the Institute and live up to the rules than those who do. This is especially true in regard to milk. Patients who get milk continue to come to the Institute for a long time and live up to the rules in order to get the milk. During the year 1903 upwards of 60% of the patients received supplies of one kind or another, and during the years 1904 and 1905 upwards of 90% received supplies of one kind or another. During the three years only about one-fourth of the patients received milk. Our figures show that many of the patients who did not get milk made one visit only and quite a few made two visits only. During the year 1905, for instance, of the patients who made one visit 50% did not get milk, and of the patients who made two visits 41% did not get milk. All patients are instructed in the prevention of tuberculosis on their first visit and are given rules by which they are to be governed, but when the patient does not return a second time to the Institute, even though he is visited once by a nurse, absolute control of him is never obtained, and all that the Institute is able to do for him is what he gets out of the rules and instructions.

IRVIN E. BENNETT,
LAWRENCE F. FLICK.

TUBERCULOSIS IN ORPHAN CHILDREN.*

This report represents the results obtained in an examination of one hundred and twenty-two boys at an orphanage in Philadelphia. The work was undertaken to determine, if possible, at what age pulmonary tuberculosis manifests itself in seemingly latent cases of lymphatic tuberculosis. Examinations were made of the superficial lymphatic structures, the pupils, the teeth, etc., in order to determine whether boys of tuberculous or of non-tuberculous parentage contribute most abnormalities in these parts.

Groups were arranged according to age in order to determine at what time of youth or adolescence abnormality of these organs is most frequent and what relationship it bears to tuberculosis. The temperature, the height, and the weight of each case were recorded. The temperature was taken in order to note what effect age or parentage might have on it. The index of corpulence (weight divided by height in feet) was employed to compare the two groups of cases—those of non-tuberculous with those of tuberculous parentage; likewise, those of single with those of double tuberculous parentage. The latter comparison may be of value in determining whether or not parental infection confers immunity upon the offspring.

The examinations were commenced May 28, 1906, and completed December 3, 1906. Considerable difficulty was encountered in eliciting definite family histories in many cases. Questions were asked relative to the date of death of parent or parents, the duration of their tuberculosis, the length of time to which the

*I wish to express my deep appreciation of the assistance rendered by Dr. Flick, upon whose suggestion this work was undertaken. I am indebted to Dr. Walsh also for his kind assistance.

boy was exposed to infection, and his general condition up to the time of examination. Many times the period of duration of the tuberculosis of the parent was given as a few months. In a number of such cases there are manifest errors, and the duration of the disease was unquestionably a matter of years.

The order of examination was as follows: Name, age, occupation (if any), family history, previous personal history, date of admission to institution, present condition, physique with especial reference to thorax, complexion, heart, lungs, cervical glands with occipital, posterior auricular, and submaxillary, axillary, epitrochlear and inguinal glands; tonsils, fauces, and pharynx, teeth, pupils, irides, pulse, temperature, time of day, height, and weight.

TABLE I.—ABNORMALITIES IN ALL BOYS EXAMINED.

	PARENTAGE.				TOTAL.	PER CENT.
	Tuberculous.	Per Cent.	Non-tuberculous.	Per Cent.		
Number of boys examined,.....	59	48.3	63	51.7	122	..
Single tuberculous parentage,.....	45	36.9	..	..	..	..
Double tuberculous parentage,.....	14	11.4	..	..	..	..
Enlarged cervical glands, superficial and deep,.....	24	48.9	25	51.1	49	40.1
Enlarged cervical glands, superficial, ..	45	52.3	41	47.7	86	70.5
" " " deep,.....	28	43.0	37	57.0	65	53.2
" axillary glands,.....	30	55.5	24	44.4	54	44.2
" inguinal glands,.....	40	53.3	35	46.6	75	61.5
" cervical, and axillary inguinal glands,.....	21	63.6	12	36.4	33	27.0
Enlarged epitrochlear glands,.....	2	33.3	4	66.6	6	4.9
" tonsils,.....	40	54.8	33	45.2	73	59.8
Mydriasis present,.....	13	68.4	6	31.6	19	15.5
" absent,.....	45	45.4	54	54.6	99	81.2
Eye diseases (conjunctivitis, etc.),....	1	25.0	3	75.0	4	3.3
Carious teeth,.....	26	50.0	26	50.0	52	42.6
Temperatures: 98.0°-98.6°,.....	4	26.6	11	73.3	15	12.3
98.7°-99.6°,.....	45	50.5	44	49.5	89	72.9
99.7°-100.6°,.....	10	71.4	4	28.6	14	11.5
100.7°-101.6°,.....	..	..	3	..	3	2.5
101.7°-102.6°,.....	..	..	1	..	1	0.8
Number of boys weighed,.....	48	46.1	56	53.9	104	..
Index of corpulence, average,.....	16.07		16.56		..	..

Forty-eight and three-tenths per cent. of the cases were of

tuberculous parentage; of these, the proportion of single to double tuberculous parentage was 3.2 to 1. The number of cases showing enlargement of the superficial cervical, the axillary, and the inguinal glands, as well as those in which all three groups were enlarged, is greater on the side of tuberculous parentage, while the number of cases of enlargement of both the superficial and deep cervicals is greater on the side of non-tuberculous parentage, this latter being especially pronounced in the enlargement of the deep cervical group alone. Seventy and five-tenths per cent. of the total number of cases exhibited enlarged superficial cervical glands; next in frequency are the inguinals, the deep cervicals, and the axillaries. No history of syphilis is recorded in those presenting epitrochlear enlargement.

Rather an arbitrary division of sizes was made in order to define clearly the enlarged and the unenlarged glands. Those having the size of a split-pea or less were classed as unenlarged glands. The "deep cervical glands" are those along the anterior border of the sternomastoid muscle.

The boys of tuberculous parentage showed enlarged tonsils more frequently than the others. A small number showed moderate to marked dilatation of the pupils, and of these the majority had tuberculous parents. The eye diseases recorded are conjunctivitis and cataract (congenital). One case had had several instillations of atropin. The number of cases of carious teeth is 42.6% of the total, and is equally divided between the two classes.

Twelve per cent. of the one hundred and twenty-two cases gave a normal temperature and 74% of these were of non-tuberculous parentage. Higher temperatures (99.7° to 100.6° F.) were more frequent among the boys of tuberculous parentage than among those of non-tuberculous parentage. The three cases with temperatures between 100.7° and 102.6° , one of whom showed an acute pleurisy, another an acute tonsillitis, and another gave a previous history of malaria, were of non-tuberculous parentage.

Examination of the blood of the case with a history of malaria failed to show plasmodia.

Eighteen of the boys left the institution shortly after the examination of the lungs, lymph-glands, etc., had been made, which accounts for the fact that only one hundred and four were weighed and the index of corpulence determined. The index is somewhat higher in the non-tuberculous class of boys than in the tuberculous.

TABLE II.—ABNORMALITIES IN BOYS OF TUBERCULOUS PARENTAGE.

	TUBERCULOUS PARENTAGE.		
	Single.	Double.	Total.
Enlarged cervical glands, superficial and deep,.....	20	4	24
“ “ “ superficial,.....	35	10	45
“ “ “ deep,.....	23	5	28
“ axillary glands,.....	22	8	30
“ inguinal glands,.....	33	7	40
“ cervical, axillary, and inguinal glands,.....	17	4	21
“ tonsils,.....	33	7	40
Mydriasis,.....	8	5	13
Carious teeth,.....	21	5	26
Temperatures: 98.0°-98.6°,.....	3	1	4
98.7°-99.6°,.....	33	12	45
99.7°-100.6°,.....	9	1	10
100.7°-101.6°,.....	..	..	..
101.7°-102.6°,.....	..	..	..
Index of corpulence, average,.....	16.0	16.2	..

This table shows that with the exception of the axillary glands, there is a relatively larger number of cases of enlargement of the superficial lymphatic glands among those boys who have lost one parent with tuberculosis than among those who have lost both. On the other hand, the largest number of cases of mydriasis are among those who have had both parents tuberculous. Carious teeth appear more frequently in the class with single tuberculous parentage than in that with double. Temperatures of 98.7° to 99.6° occur a little more frequently in boys with both parents tuberculous than in boys with one parent tuberculous, while higher temperatures—99.7° to 100.6°—are more frequent in boys with one parent tuberculous. The index of corpulence is somewhat higher

in the boys who have had both parents tuberculous than in the boys with one parent tuberculous.

TABLE III.—RELATION OF AGE TO ABNORMALITIES.

	8 TO 10 YEARS.			11 TO 13 YEARS.			14 TO 16 YEARS.			17 YEARS.		
	S.	D.	N.-T.	S.	D.	N.-T.	S.	D.	N.-T.	S.	D.	N.-T.
Enlarged cervical glands, superficial and deep,....	3	..	1	13	3	13	4	1	11	..	..	..
Enlarged cervical glands, superficial,.....	3	..	1	23	8	21	8	2	18	1	..	1
Enlarged cervical glands, deep,.....	4	..	2	14	4	23	4	1	12	1	..	..
Enlarged axillary glands,...	4	..	3	16	5	15	2	2	6	..	1	..
“ inguinal glands,...	3	..	3	21	4	20	9	2	12	..	1	..
“ cervical, axillary, and inguinal glands,....	3	..	1	12	4	7	2	..	4	..	..	..
Enlarged tonsils,.....	4	..	2	22	4	22	6	3	9	1	..	..
Mydriasis,.....	..	..	..	5	4	4	3	1	2	..	..	..
Temperatures:												
98.0°-98.6°.....	..	..	1	1	1	4	..	..	6	2	..	..
98.7°-99.6°.....	1	..	3	22	8	28	10	3	12	..	1	1
99.7°-100.6°.....	3	..	..	4	1	3	2	..	1	..	..	..
100.7°-101.6°.....	..	..	..	..	..	2	..	..	1	..	..	..
101.7°-102.6°.....	..	..	..	..	1	..	..	..	..	..	..	..
Number of boys examined (total),.....	4	..	4	27	10	38	12	3	20	2	1	1

S., stands for single tuberculous parentage; D., for double tuberculous parentage; N.-T., for non-tuberculous parentage.

Considering the cases regardless of parentage, the largest relative number of enlarged lymphatic structures is recorded between the ages of eight and ten years. An exception to this rule exists in the cases of enlarged superficial cervical glands, which seem to be most frequent in the boys between the ages of fourteen and sixteen years. Mydriasis appears more frequently between eleven and thirteen years than at any other age.

In the case of tuberculous parentage the lymphatic enlargement (except the superficial cervical glands), as in all the cases, is most frequent between eight and ten years; but the superficial cervical glands are more frequently enlarged between eleven and thirteen years. In this class of cases, too, the boys between the ages of fourteen and sixteen years present relatively the greatest

number of examples of mydriasis. In six cases the lymph-glands at times became enlarged and tender. Two of these were of single tuberculous parentage, one was of double, and three were of non-tuberculous parentage. Usually but one or two of the glands were affected in this way in any one case.

There is a record of enlargement of the occipital glands in six cases. This may have been due to parasitic involvement of the areas drained by these glands. One case showed enlargement of the posterior auricular glands, explainable doubtless in the same way. The submaxillary glands were enlarged in two cases. Six of the nine cases of enlargement of the occipital, posterior auricular, and submaxillary glands were of non-tuberculous parentage. Congestion of the fauces, tonsils, or pharynx is recorded in thirteen cases, and the average temperature of these was 99.4° . Eight of them were of tuberculous parentage.

Pulmonary tuberculosis was diagnosed in one case.

H. S. Age, thirteen years. Occupation, none. Mother died of pulmonary tuberculosis and boy was exposed to infection for two years. Personal history: Cough for two years, yellow sputum, occasionally blood in sputum. Chest pains; loss of appetite and weight. Physical examination showed infiltration of the right apex. Tonsils much enlarged and congested. Moderate enlargement of lymph-glands. Temperature, 99.4° at 9 P. M. Sputum, negative (three examinations).

One case of probable tuberculosis of the cervical glands was noted. Several of the glands had already been removed by operation (no histological examination was made) and there was moderate involvement of those of other groups. Both parents of this boy were tuberculous and the father was tuberculous at the time of conception.

Another boy, of non-tuberculous parents, was epileptic. Six boys exhibited typical phthisinoid chests. Four of these were of single tuberculous parentage and two of non-tuberculous parentage. Three rachitic chests were recorded, and all were in boys of non-tuberculous parentage.

Five boys were born of parents of whom one had tuberculosis at the time of conception or during pregnancy. In three of these the father was tuberculous and in one the mother died of tuberculosis two weeks after the birth of the child. In this series of cases the heart and lungs showed no abnormality. The physiques were fairly good, except in one, which showed a phthisinoid chest. One had a splendid development. Not one of the cases showed enlargement of both superficial and deep cervical glands. One showed axillary enlargement and two inguinal. Mydriasis was present in three and enlarged tonsils in four of the cases. Temperatures ranged from 98.4° to 99.8° . The index of corpulence was 15.27, which is 0.8 lower than the average of all the boys of tuberculous parentage.

Résumé.—Forty-eight and three-tenths per cent. of the boys had tuberculous parents; 11.4% had both parents tuberculous. Enlargement of the tonsils, the superficial cervical, axillary, and inguinal glands was more frequently met with in the boys of tuberculous parents than in those of non-tuberculous parents. Enlarged superficial cervical glands were found in 70.5% of the one hundred and twenty-two cases. Doubtless many of these were tuberculous. The inguinal group was next in order of frequency of involvement. A normal temperature was recorded in 12% of the cases, and 75% of these had non-tuberculous parents. The index of corpulence was somewhat higher in the boys who had non-tuberculous parents, but of the class with tuberculous parents those who had both parents tuberculous showed a higher index than those who had a single parent tuberculous. Enlargement of the superficial lymphatic structures and mydriasis were more frequent in the boys who had one parent tuberculous than in those who had both tuberculous. Owing to the small number of cases examined, the results are in no respect conclusive, but at least a few points have been brought out that are suggestive.

W. TAYLOR CUMMINS.

THE TRAINING SCHOOL FOR NURSES OF THE HENRY PHIPPS INSTITUTE.

The Training School for Nurses was founded in 1904, a little more than a year after the opening of the institution. Previous to the founding of the School, the nursing was done by graduates of various training schools of the city, under the direction of a head nurse. This system was unsatisfactory of operation, as it was very difficult to procure competent graduate nurses who were interested in the work sufficiently to overcome their dread of contracting tuberculosis, and this condition led to a lack of sympathy and often an actual lack of care of bed patients. Moreover, the average graduate of a regular training school knew very little of the special nursing required for a tuberculous case, and, until a certain amount of instruction was given and assimilated, the patients received inadequate attention. In private practice the need of nurses trained in the modern treatment of tuberculous patients had been felt for a long time. As the Institute became more widely known, requests were received from all sides, from many physicians and from sanatoria, for nurses with the special training. It seemed as if the Institute should do what was in its power to help meet the demand.

By the founding of the School, the problem of nursing in the Institute has been solved in a way that has proved increasingly satisfactory. At present the work of the Training School presents a most interesting phase of the crusade against tuberculosis. The pupils are drawn almost without exception from young women who have been tuberculous cases themselves, who have taken a full course of treatment at the White Haven Sanatorium

and have been discharged with the disease arrested. The employment of these young women as pupil nurses is of benefit from many points of view. They have an absorbing interest in the disease from which they themselves have suffered; they have sympathy with the advanced cases that they are called upon to nurse; they present to their patients an inspiring object-lesson of what may be accomplished in the arrest of the disease; they come to the Institute after having had a valuable preliminary training at White Haven; and, most important of all from the point of view of prevention, they are given an opportunity on their discharge from the Sanatorium of immediately entering an occupation in which they have a present livelihood, and the prospect of a respectable earning capacity after graduation. In this way a partial solution is offered to the problem—perhaps the most perplexing one in the struggle against the disease among the poor—of providing profitable employment for arrested cases.

It may here be said that from the standpoint of the physical welfare of these pupil nurses, the plan has been very satisfactory, as far as one can judge from a trial of two and a half years. The records of those entering the Training School are much better, as far as the preservation of health and confirmation of cure is concerned, than are the records of similar cases leaving White Haven to go back to their old occupations as saleswomen, seamstresses, etc. The good results are easily understood, when one considers the careful regulation of hours of work, the extra care at periods of depression, and the supervision of the nurses by the physician to the Training School.

Altogether, so far, there have been twenty pupil nurses, who have been arrested tuberculous cases from the White Haven Sanatorium. Of the twenty, six were graduated in October, 1905. All of the six graduates are in good health and occupying good positions as sanatorium nurses or in private work. Of the other fourteen, one failed to pass the final examinations, and, therefore, did not receive a certificate; she is in good physical

condition and is earning a comfortable living as a sanatorium attendant; ten are still in the Training School, and three have broken down in health and have been obliged to return for a further cure at White Haven.

The course of study covers two years, and consists of lectures to the senior and junior nurses by members of the Staff. These lectures cover the field of anatomy, physiology, materia medica, general medicine, and surgery. A special course in cooking is given at the Drexel Institute. Text-book instruction in nursing is given by the head nurse, and practical work is demonstrated in the wards.

In addition to the actual nursing in the wards and dispensaries, the pupils alternate in serving as inspectresses, who visit the homes of the out-patients, make careful records of the conditions found there, and give practical instruction to the families. This phase of the work provides outside employment during a certain period of the course, and also opens up to the nurses something of the sociological side of the crusade.

Examinations are held at the end of each year, and on graduation a certificate of proficiency in the nursing of tuberculous cases is given.

In arranging for admission to the Training School of nurses who have perhaps broken down while pupils in a training school of a general hospital, allowance is made for previous training on the basis of six months for each year of such training. Graduate nurses, who have received certificates from general training schools, are admitted for a post-graduate course of six months of tuberculous nursing.

The following are the graduates of 1905: Miss Ella T. McKinney, Mrs. M. Elizabeth Hoffman, Miss Mary B. Cornell, Miss Clara Waugh, Miss Mary P. McCoach, Miss Margaret Sweeney.

CHARLES J. HATFIELD.

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73	..	..	154	218	224, 225, 226, 227	..	263, 264
106	..	112, 113	154	..	..	231, 234, 235, 237, 240, 241	259, 264, 265
139	89, 96	..	..	..	..	..	..
182	89, 97	..	..	..	..	..	..
232	..	..	..	..	..	..	311
236	..	..	..	..	..	..	311
282	..	..	..	..	..	..	311
302	..	..	154	218, 221	225, 226, 227	..	265, 266
388	..	..	154	218	225, 226, 227	..	..
501	..	..	..	..	..	..	311
551	..	..	..	..	..	..	311
714	..	..	..	..	..	..	311, 312
781	..	110, 111	154	218	225, 226, 227	..	266, 267
871	..	..	..	..	..	232	..
917	..	..	..	..	..	232	..
945	..	..	..	..	..	..	312
975	..	138, 139	154	218	224, 225, 226, 227	..	267, 268
1032	..	..	..	..	..	..	312
1062	89, 92, 96, 97	..	..	..	..	..	..
1092	89	..	..	..	..	232	..
1163	..	136	..	..	..	..	..
1297	..	..	..	..	..	..	312
1518	..	140	..	..	..	..	..
1577	..	..	..	..	..	..	312
1656	..	..	..	..	..	232	..
1694	90, 98	..	..	..	..	230	..

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1767	..	..	..	154	218, 221	224, 225, 226, 227	..	268, 269
1896	..	..	..	..	..	..	..	312
1950	90, 98	..	..	..	..	..	..	..
1975	90, 98	..	..	..	..	..	..	..
2019	89	..	136	..	..	..	230, 231	..
2046	..	..	..	..	..	..	..	312, 313
2102	..	..	..	..	..	..	..	313
2117	89, 93, 97	..	..	..	..	..	..	..
2121	..	106, 107	..	..	..	..	..	..
2139	89	..	..	..	..	..	..	..
2146	89, 93, 97	..	..	..	..	..	..	..
2180	..	..	..	..	..	..	..	313
2184	..	..	..	..	..	..	230	..
2213	..	..	..	..	..	..	..	313
2214	90	..	..	..	..	..	..	..
2252	..	..	..	..	..	..	..	313
2262	..	..	..	..	..	..	..	313
2284	..	..	..	154	218	225, 226, 227	..	..
2289	..	..	..	..	..	..	..	313, 314
2344	..	..	..	..	..	..	..	314
2347	..	..	..	..	..	..	..	314
2356	..	..	..	..	..	..	..	314
2388	..	..	..	154	218	225, 226, 227	..	..
2468	..	..	..	..	..	..	..	314
2477	..	..	..	..	..	..	..	314
2481	..	..	111, 139	154	218	225, 226, 227	..	269, 270
2490	..	..	..	..	..	..	..	314, 315
2494	..	..	..	..	..	..	..	315
2553	..	..	..	..	..	..	..	315
2564	..	..	..	..	..	..	..	315
2576	..	..	..	..	..	..	..	315
2582	..	..	..	..	..	..	..	315
2592	89	..	..	..	..	..	..	..
2596	..	..	..	..	..	..	232	315, 316
2601	90, 94, 95	..	..	..	..	..	232	..
2602	..	..	..	..	..	..	..	316
2616	89	..	..	..	..	..	..	..

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2632	..	..	..	154	218, 220	225, 226, 227	..	271, 272
2657	..	..	..	..	..	..	..	316
2660	65	..	..	..	..	..	..	..
2662	..	..	..	..	..	..	..	316
2664	..	..	..	..	218, 220	223, 225, 226, 227	..	316
2668	..	..	..	..	..	..	..	316
2672	..	..	..	154	218	252, 226, 227	..	..
2674	..	..	..	..	..	..	231	..
2676	..	90, 98, 99, 100	110, 139	154	218, 221 225	226, 227	..	..
2689	..	..	..	..	..	..	..	316, 317
2691	..	90, 98	..	..	..	..	..	..
2701	..	..	..	..	..	..	..	317
2724	..	89	..	..	..	..	..	..
2764	..	..	..	154	217, 218 220	224, 225, 226, 227	..	..
2768	..	..	..	..	..	..	..	317
2780	..	..	..	154	218, 221	225, 226, 227	..	272, 273
2787	..	..	..	..	..	..	..	317
2796	..	..	..	..	..	..	..	317
2800	..	..	..	..	..	..	..	317
2815	..	..	..	..	..	..	..	317
2821	..	..	..	..	..	..	..	318
2826	..	..	..	..	..	..	231	..
2828	..	..	..	154	218, 221	225, 226, 227	..	273, 274
2855	..	..	..	..	..	..	..	318
2856	..	..	..	..	..	..	..	318
2861	..	89	..	..	..	..	..	..
2868	..	..	..	..	..	..	230	..
2899	..	..	..	..	..	..	..	318
2926	..	..	..	..	..	..	..	318
2927	..	..	..	..	..	..	231	..
2957	..	..	..	154	218	225, 226, 227	..	274, 275
2977	..	..	..	154	..	..	..	318
2989	..	..	..	..	218	225, 226, 227	..	318, 319
3010	..	..	..	..	..	..	..	319
3050	..	..	140	154	218	225, 226, 227	..	275, 276
3054	..	..	..	155	218	225, 226, 227	..	319

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3096	..	..	..	..	155	218	225, 226, 227	234, 236, 237, 238, 241, 242	..
3098	..	89	..	..	..	..	..	..	..
3117	..	..	..	..	155	218, 221	225, 226, 227	..	..
3120	..	..	..	..	155	218	225, 226, 227	..	277, 278
3121	..	..	..	140, 141	..	..	..	..	..
3133	..	..	..	..	155	218, 221	225, 226, 227	..	278, 279
3138	..	..	..	139	..	..	..	..	..
3142	..	..	..	..	155	218	225, 226, 227	..	279, 280
3143	..	..	..	136	..	..	..	..	..
3150	..	..	..	137	..	..	..	..	..
3156	..	..	..	..	155	218	225, 226, 227	..	280, 281
3158	41	..	..	..	..	..	..	..	..
3160	..	89, 94, 97	..	..	..	..	..	..	..
3163	..	..	..	111	155	218	225, 226, 227	..	281, 282
3182	..	..	..	..	155	218	223, 225, 226, 227	232	282, 283
3207	..	..	..	139	155	218	225, 226, 227	..	283, 284
3211	..	89, 94	..	..	..	..	..	..	..
3215	..	..	..	..	155	218	225, 226, 227	231, 235, 237, 241, 242, 243	..
3220	..	..	..	..	155	..	..	..	286, 287
3226	..	..	..	..	..	..	..	231	..
3235	..	..	..	137	..	..	..	..	..
3237	..	..	..	137	..	..	..	..	..
3249	..	..	..	137	..	..	..	..	..
3251	..	..	..	..	155	218	225, 226, 227	..	..
3253	..	..	..	..	155	..	..	..	..
3256	..	..	106	..	..	..	..	..	..
3261	..	..	..	137	..	..	..	..	..
3264	..	..	..	..	155	218	223, 225, 226, 227	..	284, 285
3265	41	..	..	..	..	..	..	..	..
3270	..	89	..	..	..	..	..	..	..
3280	..	..	..	..	..	..	..	231	..
3290	..	..	..	139	..	..	..	..	..
3295	..	89, 93, 97	..	..	..	..	..	..	..
3300	..	..	..	137	..	..	..	..	..
3328	42	..	..	..	..	..	..	..	..

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3329	..	..	155	..	..	..	..
3330	..	..	..	..	..	231	..
3334	90, 94, 97	..	..	..	..	..	..
3339	..	137	..	..	..	..	..
3355	..	..	155	218	224, 225, 226, 227	..	285, 286
3359	89	..	..	..	..	..	..
3378	..	..	..	..	..	231	..
3380	90, 94, 97	..	..	..	..	..	..
3388	..	..	155	217, 218, 220	225, 226, 227	..	319
3393	89, 94	..	..	..	..	..	..
3404	..	..	155	218	225, 226, 227	..	287, 288
3405	..	..	155	218, 221	225, 226, 227	234, 236, 237, 238, 241, 242	288, 289
3425	..	137	..	..	..	..	..
3432	..	..	155	218	225, 226, 227	236, 237, 240, 241, 242, 243	289, 290
3435	..	111	155	218	225, 226, 227	232, 234, 236, 237, 239, 241, 242, 243	290, 291
3440	..	110	155	217, 218, 220	225, 226, 227	234, 237, 239, 241, 242, 243	291, 292
3451	..	..	155	218, 221	225, 226, 227	231	292
3457	..	139	..	..	..	..	..
3458	..	..	..	..	..	232	..
3474	..	..	156	218	225, 226, 227	..	293
3496	..	..	..	..	..	232	..
3499	..	139	156	218	225, 226, 227	..	294
3512	..	..	156	218	225, 226, 227	..	..
3519	..	..	156	218	225, 226, 227	..	295
3521	..	137	156	219	225, 226, 227	..	295, 296, 297
3526	..	..	156	219	225, 226, 227	..	297, 298
3537	..	140	156	219	224, 225, 226, 227	..	320, 321
3547	..	..	156	219	225, 226, 227	..	298, 299
3548	..	..	..	..	..	..	299, 300
3559	..	..	156	219	225, 226, 227	..	300, 301
3560	..	117, 118, 137, 138	156	219	225, 226, 227	..	301, 302

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3567	90, 94, 97	..	..	..	..	..	..	..
3570	90, 94	..	..	..	..	..	..	..
3589	..	..	..	156	219	223, 225, 226, 227	234, 237, 239, 240, 241, 242, 243	..
3607	90	..	..	..	..	..	..	..
3633	..	..	..	156	..	..	..	302, 303
3635	89, 93	..	..	..	..	..	..	..
3636	90, 95, 97	..	..	..	..	..	..	..
3637	91, 94, 97	..	..	..	..	..	..	..
3638	..	..	139	..	..	..	..	..
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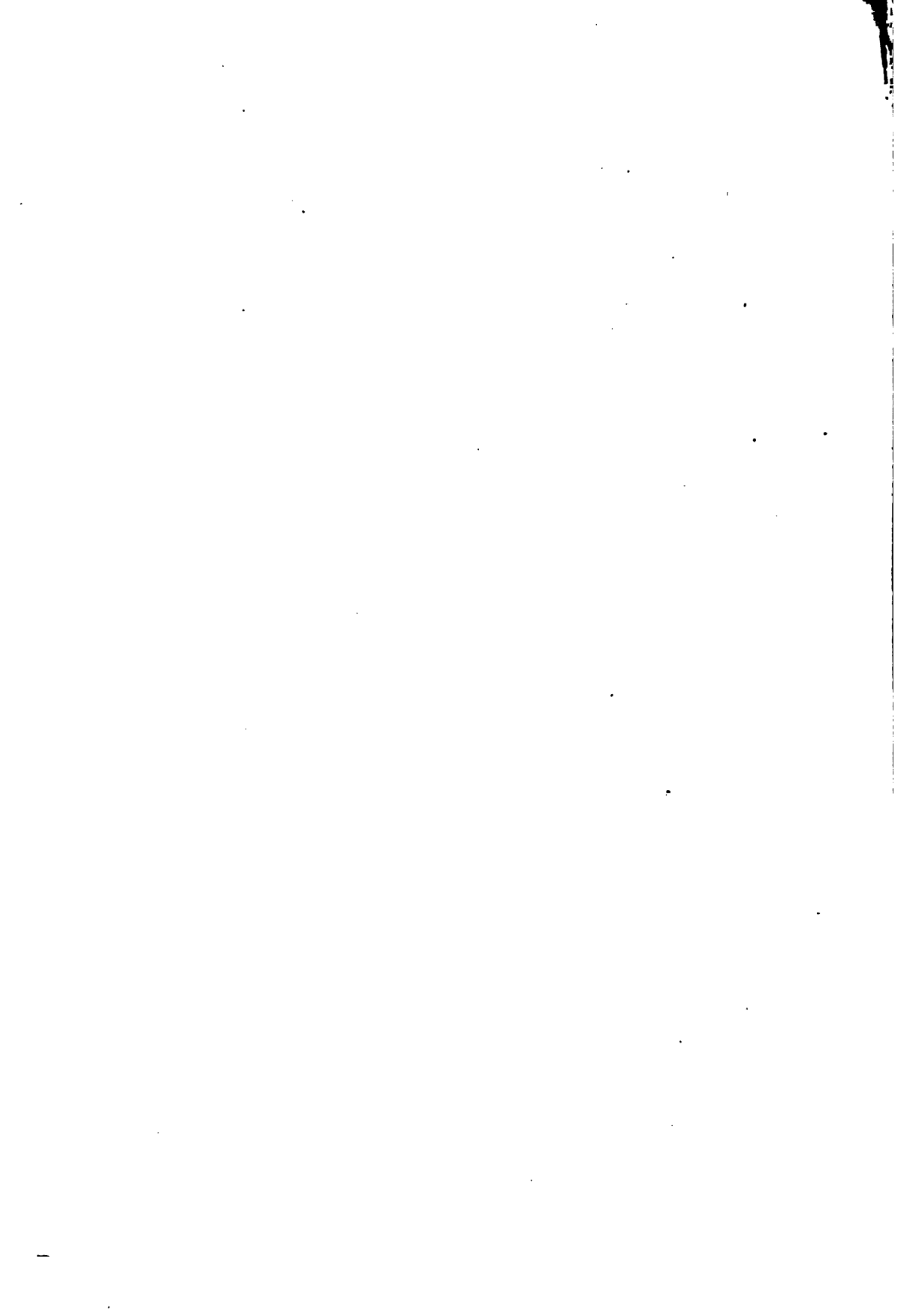
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